REGULATIONS, CURRICULUM AND SYLLABUS

for

B. TECH

Electronics & Instrumentation Engineering

PONDICHERRY UNIVERSITY
PONDICHERRY-605 014

PONDICHERRY UNIVERSITY
BACHELOR OF TECHNOLOGY PROGRAMMES
(EIGHT SEMESTERS)

REGULATIONS

1. Conditions for Admission:

(a) Candidates for admission to the first semester of the 8 semester B.Tech Degree programme should be required to have passed :

The Higher Secondary Examination of the (10+2) curriculum (Academic Stream) prescribed by the Government of Tamil Nadu or any other examination equivalent there to with minimum of 45% marks (a mere pass for OBC and SC/ST candidates) in aggregate of subjects – Mathematics, Physics and any one of the following optional subjects: Chemistry / Biotechnology/ Computer Science / Biology (Botany & Zoology) or an Examination of any University or Authority recognized by the Executive Council of the Pondicherry University as equivalent thereto.

(b) For Lateral entry in to third semester of the eight semester B.Tech programme :

The minimum qualification for admission is a pass in three year diploma or four year sandwich diploma course in engineering / technology with a minimum of 60 % marks (50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in the subjects covered from 3rd to final semester or a pass in any B.Sc. course with mathematics as one of the subjects of study with a minimum of 60 % marks (50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in main and ancillary subjects excluding language subjects. The list of diploma programs approved for admission for each of the degree programs is given in **Annexure A**.

2. Age Limit :

The candidate should not have completed 21 years of age as on 1st July of the academic year under consideration. For Lateral Entry admission to second year of degree programme , candidates should not have completed 24 years as on 1st July of the academic year under consideration. In the case of SC/ST candidates, the age limit is relaxable by 3 years for both the cases.

3. Duration of Programme :

The Bachelor of Technology degree programme shall extend over a period of 8 consecutive semesters spread over 4 academic years – two semesters constituting one academic year. The duration of each semester shall normally be 15 weeks excluding examinations.

4. Eligibility for the award of Degree:

No candidate shall be eligible for the award of the degree of Bachelor of Technology, unless he/she has undergone the course for a period of 8 semesters (4 academic years) / 6 semesters (3 academic years for Lateral Entry candidates) in the faculty of Engineering and has passed the prescribed examinations in all the semesters.

5. Branches of Study:

Brach I	- Civil Engineering
Branch II	- Mechanical Engineering
Branch III	- Electronics & Communication Engineering
Branch IV	- Computer Science & Engineering
Branch V	- Electrical & Electronics Engineering
Branch VI	- Chemical Engineering
Branch VII	- Electronics & Instrumentation Engineering
Branch VIII	- Information Technology
Branch IX	- Instrumentation & Control Engineering
Branch X	- Biomedical Engineering

or any other branches of study as and when offered. The branch allocation shall be ordinarily done at the time of admission of the candidate to the first semester.

6. Subjects of Study:

The subjects of study shall include theory and practical courses as given in the curriculum and shall be in accordance with the prescribed syllabus. The subjects of study for the first two semesters shall be common for all branches of study.

7. Examinations:

The theory and practical examinations shall comprise continuous assessment throughout the semester in all subjects as well as university examinations conducted by Pondicherry University at the end of the semester (November / December or April / May).

(a) Theory courses for which there is a written paper of 75 marks in the university examination**.**

The Internal Assessment marks of 25 has to be distributed as 10 marks each for two class tests and 5 marks for class attendance in the particular subject. The distribution of marks for attendance is as follows.

5 marks for 95% and above
4 marks for 90% and above but below 95%
3 marks for 85% and above but below 90%
2 marks for 80% and above but below 85%
1 mark for 75% and above but below 80%

In total, three tests are to be conducted and the better two are to be considered for assessment.

(b) Practical courses for which there is a university practical examination of 50 marks**:**

The internal assessment marks of 50 has to be distributed as 20 marks for the periodic practical works and records submitted thereof, 15 marks for an internal practical examination, 5 marks for an internal viva voce, and 10 marks for class attendance in the particular subject. The distribution of marks is as given below.

10 marks for 95% and above
8 marks for 90% and above but below 95%
6 marks for 85% and above but below 90%
4 marks for 80% and above but below 85%
2 marks for 75% and above but below 80%

8. Requirement for appearing for University Examination:

A candidate shall be permitted to appear for university examinations at the end of any semester only if:

(i) He / She secures not less than 75% overall attendance arrived at by taking into account the total number of periods in all subjects put together offered by the institution for the semester under consideration.

(Candidates who secure overall attendance greater than 60% and less than 75% have to pay a condonation fee as prescribed by University along with a medical certificate obtained from a medical officer not below the rank of Asst. Director)

(ii) He / She earns a progress certificate from the Head of the institution for having satisfactorily completed the course of study in all the subjects pertaining to that semester.

(iii) His / Her conduct is found to be satisfactory as certified by the Head of the institution.

A candidate who has satisfied the requirement (i) to (iii) shall be deemed to have satisfied the course requirements for the semester.

9. Procedure for completing the course:

A candidate can join the course of study of any semester only at the time of its normal commencement and only if he/she has satisfied the course requirements for the previous semester and further has registered for the university examinations of the previous semester in all the subjects as well as all arrear subjects if any.

However, the entire course should be completed within 14 consecutive semesters (12 consecutive semesters for students admitted under lateral entry).

10. Passing Minimum:

(i) A candidate shall be declared to have passed the examination in a subject of study only if he/she secures not less than 50% of the total marks (Internal Assessment plus University examination marks) and not less than 40% of the marks in University examination.

(ii) A candidate who has been declared "Failed" in a particular subject may reappear for that subject during the subsequent semesters and secure a pass. However, there is a provision for revaluation of failed or passed subjects provided he/she fulfills the following norms for revaluation.

(a) Applications for revaluation should be filed within 4 weeks from the date of declaration of results or 15 days from the date of receipt of marks card whichever is earlier.

(b) The candidate should have attended all the college examinations as well as university examinations.

(c) If a candidate has failed in more than two papers in the current university examination, his/her representation for revaluation will not be considered.

(d) The request for revaluation must be made in the format prescribed duly recommended by the Head of the Institution along with the revaluation fee prescribed by the University.

The internal assessment marks obtained by the candidate shall be considered only in the first attempt for theory subjects alone. For the subsequent attempts, University examination marks will be made upto the total marks. Further the University examination marks obtained in the latest attempt shall alone remain valid in total suppression of the University examination marks obtained by the candidate in earlier attempts.

11 Award of Letter Grades:

The assessment of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain points, will be awarded as per the range of total marks (out of 100) obtained by the candidate, as detailed below:

Range of Total Marks	Letter Grade	Grade Points
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
0 to 49	F	0
Incomplete	FA	

'F' denotes failure in the course. 'FA' denotes absent / detained as per clause 8.

After results are declared, grade sheets will be issued to the students. The grade sheets will contain the following details:

(a) The college in which the candidate has studied.

(b) The list of courses enrolled during the semester and the grades scored.

(c)The Grade Point Average (GPA) for the semester and The Cumulative Grade Point Average (CGPA) of all enrolled subjects from first semester onwards.

(d) GPA is the ratio of sum of the products of the number of credits (C) of courses registered and the corresponding grades points (GP) scored in those courses, taken for all the courses and sum of the number of credits of all the courses

$$GPA = \left(Sum\ of\ \ (C \times GP) / Sum\ of\ \ C \right)$$

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. FA grades are to be excluded for calculating GPA and CGPA.

The conversion of CGPA into percentage marks is as given below

$$\%\, Marks = (CGPA - 0.5) \times 10$$

12 Award of Class and Rank:

(i) A candidate who satisfies the course requirements for all semesters and who passes all the examinations prescribed for all the eight semesters (six semesters for lateral entry candidates) within a maximum period of 7 years (6 years for lateral entry candidates) reckoned from the commencement of the first semester to which the candidate was admitted shall be declared to have qualified for the award of degree.

(ii) A candidate who qualifies for the award of the degree passing in all subjects pertaining to semesters 3 to 8 in his/her first appearance within 6 consecutive semesters (3 academic years) and in addition secures a CGPA of 8.50 and above for the semesters 3 to 8 shall be declared to have passed the examination in **FIRST CLASS** with **DISTINCTION**.

(iii) A candidate who qualifies for the award of the degree by passing in all subjects relating to semesters 3 to 8 within a maximum period of eight semesters after his/her commencement of study in the third semester and in addition secures CGPA not less than 6.5 shall declared to have passed the examination in **FIRST CLASS**.

(iv) All other candidates who qualify for the award of degree shall be declared to have passed the examination in **SECOND CLASS**.

(v) For the Award of University ranks and Gold Medal for each branch of study, the CGPA secured from 1^{st} to 8^{th} semester alone should be considered and it is mandatory that the candidate should have passed all the subjects from 1^{st} to 8^{th} semester in the first attempt. Rank certificates would be issued to the first ten candidates in each branch of study.

13. Provision for withdrawal:

A candidate may, for valid reasons, and on the recommendation of the Head of the Institution be granted permission by the University to withdraw from writing the entire semester examination as one Unit. The withdrawal application shall be valid only if it is made earlier than the commencement of the last theory examination pertaining to that semester. Withdrawal shall be permitted only once during the entire course. Other conditions being satisfactory, candidates who withdraw are also eligible to be awarded DISTINCTION whereas they are not eligible to be awarded a rank.

14. Discontinuation of Course:

If a candidate wishes to temporarily discontinue the course for valid reasons, he/she shall apply through the Head of the Institution in advance and obtain a written order from the University permitting discontinuance.A candidate after temporary discontinuance may rejoin the course only at the commencement of the semester at which he/she discontinued, provided he/she pays the prescribed fees to the University. The total period of completion of the course reckoned from the commencement of the first semester to which the candidate was admitted shall not in any case exceed 7 years, including of the period of discontinuance.

15. Revision of Regulations and Curriculum:

The University may from time to time revise, amend or change the regulations of curriculum and syllabus as and when found necessary.

ANNEXURE – A

B.Tech courses in which admission is sought	Diploma courses eligible for admission
Civil Engineering	Civil Engineering Civil and Rural Engineering Architectural Assistantship Architecture Agricultural Engineering
Mechanical Engineering	Mechanical Engineering Automobile Engineering Agricultural Engineering Mechanical and Rural Engineering Refrigeration and Air-conditioning Agricultural Engineering & Farm Equipment Technology Metallurgy Production Engineering Machine Design & Drafting Machine tool maintenance and Repairs Printing Technology / Engineering Textile Engineering / Technology Tool Engineering
Electrical and Electronics Engineering Electronics & Communication Engineering Electronic and Instrumentation Engineering Instrumentation and Control Engineering Bio Medical Engineering	Electrical Engineering Electrical and Electronics Engineering Electronics and Instrumentation Engineering Instrumentation Engineering / Technology Electronics and Communication Engg. Electronics Engineering Medical Electronics Instrumentation and Control Engineering Applied Electronics
Chemical Engineering	Chemical Engineering Chemical Technology Petrochemical Technology Petroleum Engineering Ceramic Technology Plastic Engineering Paper & Pulp Technology Polymer Technology
Information Technology Computer Science & Engineering	Computer Science and Engineering Computer Technology Electrical and Electronics Engineering Electronics & Communication Engineering Electronics & Instrumentation Engineering Instrumentation Engineering / Technology

CURRICULUM
B.TECH (ELECTRONICS & INSTRUMENTATION ENGINEERING)
(With effect from Academic year 2009 – 10)

I semester

Code No	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
T101	Mathematics-I	3	1	0	4	25	75	100
T102	Physics	3	0	0	4	25	75	100
T103	Chemistry	3	0	0	4	25	75	100
T110	Basic Civil and Mechanical Engineering	4	0	0	4	25	75	100
T111	Engineering Mechanics	2	1	0	4	25	75	100
T112	Communicative English	3	0	0	3	25	75	100
	Practical							
P104	Physics Lab	0	0	3	2	50	50	100
P105	Chemistry Lab	0	0	3	2	50	50	100
P106	Work Shop Practice	0	0	3	2	50	50	100
	Total	18	2	9	29	300	600	900

II semester

Code	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
T107	Mathematics-II	3	1	0	4	25	75	100
T108	Material Science	3	0	0	2	25	75	100
T109	Environmental Science	3	0	0	2	25	75	100
T104	Basic Electrical and Electronics Engineering	3	1	0	4	25	75	100
T105	Thermodynamics	2	1	0	4	25	75	100
T106	Computer Programming	3	0	0	3	25	75	100
	Practical							
P101	Computer Programming Lab	0	0	3	2	50	50	100
P102	Engineering Graphics	2	0	3	2	50	50	100
P103	Basic Electrical and Electronics Lab	0	0	3	2	50	50	100
P107	NSS/NCC*	-	-	3	0	100	-	100
	Total	19	3	12	27	400	600	1000
To be completed in I and II semesters, under Pass / Fail option only and not counted for CGPA calculation.								

III semester

Code NO	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T31	Mathematics III	3	1	0	4	25	75	100
EI T32	Electric Circuit Analysis	3	1	0	4	25	75	100
EI T33	Electron Devices and Circuits	4	0	0	3	25	75	100
EI T34	Switching Theory and Logic Design	4	0	0	3	25	75	100
EI T35	C++ and Data Structures	4	0	0	4	25	75	100
EI T36	Fluid Mechanics and Strength of Materials	4	0	0	3	25	75	100
	Practical							
EI P31	Electron Devices and Circuits Lab	0	0	3	2	50	50	100
EI P32	Fluid Mechanics & Strength of Materials Lab	0	0	3	2	50	50	100
EI P33	C++ and Data Structures Lab	0	0	3	2	50	50	100
	Total	22	2	9	27	300	600	900

IV Semester

Code NO	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T41	Mathematics IV	3	1	0	4	25	75	100
EI T42	Electronic Circuits	4	0	0	3	25	75	100
EI T43	Electrical and Electronic Instruments	4	0	0	3	25	75	100
EI T44	Sensors and Transducers	3	1	0	4	25	75	100
EI T45	Linear Integrated Circuits	4	0	0	4	25	75	100
EI T46	Electrical Machines	4	0	0	3	25	75	100
	Practical							
EI P41	Linear and Digital Integrated Circuits Lab	0	0	3	2	50	50	100
EI P42	Sensors and Transducers Lab	0	0	3	2	50	50	100
EI P43	Electrical Machines Lab	0	0	3	2	50	50	100
EI P44	Physical Education *	-	-	-	0		-	
	Total	22	2	9	27	300	600	900
*Under Pass / Fail option only and not counted for CGPA calculation.								

V semester

Code NO	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
MA T51	Numerical Techniques an **Methods**	3	1	0	4	25	75	100
EI T52	Control Systems Engineering	3	1	0	4	25	75	100
EI T53	Industrial Instrumentation-I	4	0	0	4	25	75	100
EI T54	Microprocessors & Applications	4	0	0	4	25	75	100
EI T55	Modern Measurement Techniques	3	1	0	4	25	75	100
EI T56	Process Engineering Principles	4	0	0	3	25	75	100
	Practical							
EI P51	Simulation Lab	0	0	3	2	50	50	100
EI P52	Design Project Lab	0	0	3	2	50	50	100
EI P53	Microprocessors & Applications Lab	0	0	3	2	50	50	100
EI P54	General Proficiency – I	0	0	0	2	100	-	100
	Total	22	2	9	31	400	450	1000

VI semester

Code NO	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EI T61	Process Control	4	0	0	4	25	75	100
EI T62	Industrial Instrumentation-II	4	0	0	4	25	75	100
EI T63	Communication Engineering	4	0	0	3	25	75	100
EI T64	System Design Using Microcontrollers	3	1	0	3	25	75	100
EI T65	Digital Signal Processing	4	0	0	4	25	75	100
EI E66	Elective-I	4	0	0	3	25	75	100
	Practical							
EI P61	Process Control Lab	0	0	3	2	50	50	100
EI P62	DSP and Microcontroller Based Embedded Systems Lab	0	0	3	2	50	50	100
EI P63	Modern Electronic Instruments Lab	0	0	3	2	50	50	100
EI P64	General Proficiency – II	-	-	-	2	100	-	100
	Total	23	1	9	29	400	600	1000

VII semester

Code NO	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EI T71	Computer Control of Process	4	0	0	4	25	75	100
EI T72	Analytical Instrumentation	4	0	0	4	25	75	100
EI T73	Industrial Safety and Management	4	0	0	3	25	75	100
EI E74	Elective II	4	0	0	3	25	75	100
EI E75	Elective III	4	0	0	3	25	75	100
	Practical							
EI P71	Computer Control of Process Lab	0	0	3	2	50	50	100
EI P72	Seminar	3	-	-	1	100	-	100
EI P73	Industrial Visit/Training	-	-	-	1	100	-	100
EI PW7	Project Work Phase I	0	0	3	2	100	-	100
	Total	20	0	6	23	475	425	900

VIII semester

Code	Subjects	Periods			Credits	Marks		
		L	T	P		IA	UE	TM
	Theory							
EI T81	Engineering Economics	4	0	0	3	25	75	100
EI T82	PLC and Distributed Control Systems	4	0	0	4	25	75	100
EI T83	VLSI Design	4	0	0	3	25	75	100
EI E84	Elective IV	4	0	0	3	25	75	100
EI E85	Elective V	4	0	0	3	25	75	100
	Practical							
EI P81	Industrial Automation Lab	0	0	3	2	50	50	100
EI P82	Professional Ethics Practice	-	-	-	1	100	-	100
EI P83	Comprehensive Viva-Voce	0	0	0	2	50	50	100
EI PW8	Project Work Phase II	0	0	6	6	50	50	100
	Total	24	0	9	27	375	525	900

Total Credits: 220

List of Electives

	Sixth Semester
EI E61	Industrial Electronics
EI E62	Telemetry and Telecontrol
EI E63	Visual Programming for Instrumentation Engineers
EI E64	Object-Oriented Test and Measurement Software Development
EI E65	Biomedical Instrumentation
	Seventh Semester
EI E71	Operating Systems
EI E72	Optimization Techniques
EI E73	Instrumentation and Control in Petrochemical Industries
EI E74	Power Plant Instrumentation
EI E75	Instrumentation Buses and Data Networks
EI E76	Web Based Instrumentation
EI E77	Data Base Management Systems
EI E78	Fiber Optics and Laser Instrumentation
	Eighth Semester
EI E81	Robotics and Automation
EI E82	Design of Process Control System Components
EI E83	Fuzzy Logic and Neural Networks
EI E85	Optimal Control
EI E86	Digital Image Processing
EI E87	Computer Networks
EI E88	Adaptive Control Systems

T101 MATHEMATICS – I

UNIT I

Calculus: Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.

UNIT II

Multiple Integrals and Applications: Multiple integrals – change of order of integration. Applications: Areas (double integration) and volumes by triple integration (Cartesian and polar) – mass and center of mass (constant and variable densities).

UNIT III

Analytical Solid Geometry: Directional cosines and ratios – angle between two lines – the equation of plane - equations to a straight line and shortest distance between two skew lines.

UNIT IV

Differential Equations: Exact equations, First order linear equations, Bernoulli's equation, orthogonal trajectories, growth and decay, geometrical applications and electric circuits. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT V

Differential Equations (Higher order): Linear differential equations of higher order – with constant coefficients, the operator D - Euler's linear equation of higher order with variable coefficients - simultaneous linear differential equations – solution by variation of parameters method – simple applications to electric circuits.

Text Book

1. M.K.Venkataraman, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Madras, 2001.

Reference Book

1. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications, New Delhi , 2007.

T102 PHYSICS

UNIT I

Acoustics and NDT: *Ultrasonics - U*ltrasonic Waves Productions (Piezoelectric and Magnetostriction method) – Detections (Acoustic Grating)
Acoustics - Factors affecting Acoustic of Buildings (Reverberation, Loudness, Focusing, Echo, Echelon Effect and Resonance) and their Remedies - Sabine's formula for Reverberation Time . *NDT applications* - Pulse Echo Method - Liquid Penetrant Method

UNIT II

Optics: *Interference* - Air Wedge – Michelson's Interferometer – Wavelength Determination– Interference Filter – Antireflection Coatings. *Diffraction* - Diffraction Grating – Dispersive power of grating - Resolving Power of Grating and Prism. *Polarisation* - Huygens Theory of Double Refraction – Quarter and Half Wave Plates – Specific Rotary Power – Laurent Half Shade Polarimeter

UNIT III

Lasers and Fiber Optics: *Lasers* - Principles of Laser – Spontaneous and Stimulated Emissions - Einstein's Coefficients – Population Inversion and Laser Action – Optical resonators – Types of Lasers - NdYAG, CO_2 laser, GaAs Laser
Fiber Optics - Principle and Propagation of light in optical fiber – Numerical aperture and acceptance angle – Types of optical fibers (material, refractive index, mode)

UNIT IV

Wave Mechanics: Matter Waves – de Broglie Wavelength – Uncertainty Principle – Schrödinger Wave Equation – Time Dependent – Time Independent – Application to Particle in a One Dimensional Box – Quantum Mechanical Tunneling – Tunnel Diode.

UNIT V

Nuclear Energy Source: General Properties of Nucleus (Size, Mass, Density, Charge) – Mass Defect – Binding Energy - Disintegration in fission – Nuclear Fusion (p-p and C-N cycle) – *Nuclear Reactor:* Materials Used in Nuclear Reactors. – PWR – BWR - FBTR

Text Books

1. A S Vasudeva, Modern Engineering Physics, S. Chand & Co, New Delhi, 2006.
2. V Rajendran, Engineering Physics, TMH, New Delhi 2008.

Reference Books

1. Richtmyer, Kennard and cooper , Introduction to Modern Physics, TMH, New Delhi 2005.
2. Ajay Ghatak, Optics, TMH, New Delhi, 2007.
3. Thiagarajan and Ghatak, Laser and Application, TMH, New Delhi, 2008.
4. Arthur Beiser, Concept of Modern Physics, TMH, New Delhi, 2008.
5. Avadhanulu M N and Kshir Sagar , A Text Book of Engineering Physics, S. Chand & Co, New Delhi, 2007.
6. R. Murugeshan, Modern Physics, S. Chand & Co, New Delhi, 2006.
7. K.R.Nambiar, Lasers, New Age International, New Delhi, 2008.

T103 CHEMISTRY

UNIT I

Water: Hardness of water – units and calcium carbonate equivalent. Determination of hardness of water- EDTA method. Disadvantages of hardwater-boiler scale and sludge, caustic embrittlement, priming and foaming and boiler corrosion. Water softening method – internal and external conditioning – lime-soda process, zeolite process and ion exchange process. Desalination – reverse osmosis and electrodialysis.

UNIT II

Polymers : Classification, types of polymerization reactions - mechanism of radical, ionic and Ziegler-Natta polymerizations. Polymer properties - chemical resistance, crystallinity and effect of temperature. Thermoplastics and thermosets. Polymerization techniques - bulk, suspension, emulsion, solution and gas phase polymerization. Preparation, properties and uses of PVC, TEFLON, Nylons, Bakelite, polyurethane, Mn and Mw. Rubbers - vulcanization, synthetic rubber, buna S, buna N, silicone and butyl rubber. Conducting polymers - classification and applications. Polymer composites – FRP - laminar composites.

UNIT III

Electrochemical Cells: Galvanic cells, single electrode potential, standard electrode potential, electromotive series. EMF of a cell and its measurement. Nernst equation. Electrolyte concentration cell. Reference electrodes-hydrogen calomel, Ag /AgCl and glass electrodes. Batteries - primary and secondary cells, laclanche cell, lead acid storage cell, Ni-Cd battery and alkaline battery. Fuel cells - H_2-O_2 fuel cell.

UNIT IV

Corrosion And Its Control: Chemical and electrochemical corrosion-Galvanic series-galvanic, pitting, stress and concentration cell corrosion. Factors influencing corrosion-corrosion control methods - cathodic protection and corrosion inhibitors. Protective coating - types of protective coatings-metallic coating-tinning and galvanizing, cladding, electroplating and anodizing.

UNIT V

Phase Rule: Definition and derivation of phase rule. Application to one component system - water and sulphur systems. Thermal analysis, condensed phase rule. Two component alloy systems - Pb-Ag, Cu-Ni and Mg-Zn systems.

Text books

1. P.C. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai and Sons, New Delhi 2004.
2. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry,
2nd edition. PHI Learning PVT., LTD, New Delhi, 2008.

Reference Books

1. S. S. Dara, A Textbook of Engineering Chemistry, S. Chand & Co., Ltd. New Delhi.
2. B. K. Sharma, Engineering Chemistry, 3rd edition Krishna Prakashan Media (P) Ltd., Meerut, 2001.

T 110 BASIC CIVIL AND MECHANICAL ENGINEERING

PART-A CIVIL ENGINEERING

UNIT I

Buildings, Building Materials: Buildings-Definition-Classification according to NBC-plinth area, Floor area, carpet area, floor space index-construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses.

UNIT II

Buildings and their Components: Buildings- Various Components and their functions. Soils and their classification Foundations-Functions and types of foundations, Masonry, Floors-functions and types of floors, Roofs and types of roofs.

UNIT III

Basic Infrastructure: Surveying-classification, general principles of surveying – Basic terms and definitions of chain, compass and leveling surveying , uses of surveying , contours, their characteristics and uses. Roads-types, Water bound macadam road, cement concrete road, bituminous road. Bridges-components and types of bridges. Dams-Purpose, selection of site, types of dams and components. Water supply-sources and quality requirements. Rainwater harvesting.

PART - B MECHANICAL ENGINEERING

UNIT IV

Internal and External Combustion Systems: Working principles of IC engines – Classification – Diesel and petrol engines: two stroke and four stroke engines. Steam generators(Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories.

Conventional Power Generation Systems: Hydraulic, steam and gas turbines power plants – Schemes and layouts – Selection criteria of above power plants.

UNIT V

Non-Conventional Energy Systems (Description Only): Solar thermal systems – Solar photovoltaic – Solar pond – wind, wave, tidal, geothermal and ocean thermal energy conversion systems.

Casting : Green and dry sand moulding processes for ferrous and non-ferrous metals – applications.

UNIT VI

Metal Joining: Elements of arc and gas welding, brazing and soldering – Bolted joint types – Adhesive Bonding; classification of adhesives – applications. Sheet Metal Processing- Punching, blanking, shearing, bending, and deep drawing processes; descriptions and applications .

Text Books:

1. Purushothama Raj.P., Basic civil engineering, 3rd Edn., Dhanam Publications, Chennai, 2001.
2. Natarajan, K V, Basic Civil Engineering, 11th Edition, Dhanalakshmi Publications Chennai, 2001.
3. Lindberg, R.A.Process and Materials of Manufacture, PHI, 1999.
4. Nagpal, Power Plant Engineering, Khanna Publishers, Delhi, 1998.

Reference Books

1. Rajput, R K, Engineering Materials, S Chand & Co. Ltd., New Delhi, 2002.
2. Punmia, B.C., et. al., Surveying , Vol-I, Laxmi Publishers, New Delhi, 2002.
3. Punmia, B.C., et.al Building Construction, Laxmi Publishers, New Delhi ,2002.
4. El.Wakil, M.M., Power Plant Technology, Mc Graw Hill Book Co.,1985.
5. Hajra Choudhry, et. al., Workshop Technology Vol I and II, Media Promoters Publishers Pvt. Ltd., Bombay, 2004.

T111 ENGINEERING MECHANICS

UNIT I

Fundamental of Mechanics: Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon's theorem, Resultant of force system – Concurrent and non concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, concept of free body diagrams, applications in solving the problems on static equilibrium of bodies.

UNIT II

Plane Trusses: Degrees of freedom, Types of supports and reactions, Types of loads, Analysis of Trusses-method of joints, method of sections

Friction: Introduction, Static dry friction, simple contact friction problems, ladders, wedges, screws and belt friction.

UNIT III

Properties of Surfaces: Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia.

UNIT IV

Kinematics and Kinetics of Particles: Equations of motion - Rectilinear motion, curvelinear motion, Relative motion, D'Alembert's principle, work- Energy equation – Conservative forces and principle of conservation of energy, Impulse – momentum, Impact – Direct central impact and oblique central impact.

UNIT V

Kinematics and Kinetics of Rigid bodies: Plane motion, Absolute motion, Relative motion, translating axes and rotating axes, work and energy, impulse and momentum

Text Books

1. Bhavikatti,S.S and K.G.Rajashekarappa, Engineering Mechanics, New Age International (p) Ltd, New Delhi,2008.
2. Rajesekaran, S and Sankara Subramanian., G., Engineering Mechanics, Vikas Publishing House Private Ltd., 2002.

Reference Books

1. Palanichamy, M.S. Nagan, S., Engineering Mechanics – Statics & Dynamics, Tata McGraw-Hill,2001.
2. Beer, F.P and Johnson Jr. E.R, Vector Mechanics for Engineers, Vol. 1 Statics and Vol.2 Dynamics, McGraw – Hill International Edition, 1997.

T112 COMMUNICATIVE ENGLISH

UNIT I

Basic Communication Theory: Importance of Communication – stages of communication, modes of communication – barriers to communication – strategies for effective communication – Listening: Importance, types, barriers – Developing effective listening skills.

UNIT II

Comprehension and Analysis: Comprehension of technical and non-technical material – Skimming, scanning, inferring-Note making and extension of vocabulary, predicting and responding to context- Intensive Reading and Reviewing

UNIT III

Writing: Effective sentences, cohesive writing, clarity and conciseness in writing – Introduction to Technical Writing – Better paragraphs, Definitions, Practice in Summary Writing – Four modes of writing – Use of dictionaries, indices, library references – making bibliographical entries with regard to sources from books, journals, internet etc.

UNIT IV

Business Writing / Correspondence: Report writing – Memoranda – Notice – Instruction – Letters – Resumes – Job applications

UNIT V

Oral Communication: Basics of phonetics – Presentation skills – Group Discussions – Dialogue writing – Short Extempore – Debates-Role Plays-Conversation Practice

Reference Books:

1. Ashraf M.Rizvi., Effective Technical Communication. Tata-McGraw, 2005.
2. Boove, Courtland R et al., Business Communication Today, Pearson Education, New Delhi, 2002.
3. Meenakshi Raman and Sangeeta Sharma., Technical Communication Principles and Practice,OUP, 2007.
4. Robert J.Dixson. ,Complete Course in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2006.
5. Robert J.Dixson., Everyday Dialogues in English, Prentice-Hall of India Pvt. Ltd., New Delhi,2007.
6. Sethi,J and Kamalesh Sadanand., A Practical Course in English Pronunciation, Prentice- Hall of India Pvt. Ltd, New Delhi,2007.

P104 PHYSICS LABORATORY

List of experiments (Any 10 Experiments)

1. Thermal conductivity – Lee's DISC
2. Thermal conductivity - Radial flow
3. Spectrometer – Prism or Hollow prism
4. Spectrometer – Transmission grating
5. Spectrometer - Ordinary & Extraordinary rays
6. Newton's rings
7. Air – wedge
8. Half shade polarimeter – Determination of specific rotatory power
9. Jolly's experiment – determination of α
10. Magnetism: i – h curve
11. Field along the axis of coil carrying current
12. Vibration magnetometer – calculation of magnetic moment & pole strength
13. Laser experiment: wavelength determination using transmission grating, reflection grating (vernier calipers) & particle size determination
14. Determination of optical absorption coefficient of materials using laser
15. Determination of numerical aperture of an optical fiber

P105 CHEMISTRY LABORATORY

List of experiments (Any 10 Experiments)

1. Determination of dissolved oxygen in water.
2. Determination of total hardness of water by EDTA method.
3. Determination of carbonate and bicarbonate in water.
4. Estimation of chloride content in water.
5. Estimation of magnesium by EDTA.
6. Estimation of vinegar.
7. Estimation of ferrous by permanganometry.
8. Estimation of ferrous and ferric iron in a solution mixture by dichrometry.
9. Estimation of available chlorine in bleaching powder.
10. Estimation of copper in copper sulphate solution.
11. Estimation of calcium by permanganometry.
12. Estimation of iron by colorimetry.

Demonstration Experiments(Any two of the following)

1. Determination of COD of water sample.
2. Determination of lead by conductometry.
3. Percentage composition of sugar solution by viscometry.

P106 WORKSHOP PRACTICE

Sl.No.	Trade	List of Exercises
1.	Fitting	Study of tools and Machineries. Exercises on symmetric joints and joints with acute angle.
2.	Welding	Study of arc and gas welding equipment and tools – Edge preparation – Exercises on lap joint and V Butt joints – Demonstration of gas welding
3	Sheet metal work	Study of tools and Machineries – exercises on simple products like Office tray and waste collection tray.
4.	Carpentry	Study of tools and Machineries – Exercises on Lap joints and Mortise joints

LIST OF EXERCISES

I Fitting

1.Study of tools and Machineries
2.Symmetric fitting
3.Acute angle fitting

II Welding

1.Study of arc and gas welding equipment and tools
2.Simple lap welding (Arc)
3.Single V butt welding (Arc)

III Sheet metal work

1.Study of tools and machineries
2.Funnel
3.Waste collection tray

IV Carpentry

1.Study of tools and machineries
2.Half lap joint 3.Corner mortise joint.

T107 MATHEMATICS – II

UNIT I

Algebra: Binomial, exponential and logarithmic series (without proof) – problems on summation, approximation and coefficients.

UNIT II

Matrices: Inverse of matrix by row transformation – Eigen values and Eigen vectors - Cayley-Hamilton theorem (without proof) – Diagonalisation – rank of matrix – solution of a general system of m linear algebraic equations in n unknown ($m \leq n$).

UNIT III

Trigonometry: Expansions for $\sin^n \theta$, $\cos^n \theta$, $\tan^n \theta$, $\sin(n\theta)$, $\cos(n\theta)$, $\tan(n\theta)$. Exponential, circular, hyperbolic, inverse hyperbolic and logarithmic functions of a complex variable – separation of real and imaginary parts.

UNIT IV

Vector Analysis: Scalar fields and Vector fields – Gradient, Divergence and Curl – their properties and relations – Gauss and Stokes theorems (without proof), simple problems for their verification.

UNIT V

Statistics: Moments, kurtosis and skewness based on moments only. Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions. Correlation and regression – rank correlation.

Text Books:

1. M.K. Venkataraman, Engineering Mathematics (First Year), Second Edition, The National Publishing Company, Madras, 2001.
2. M.K. Venkataraman, Engineering Mathematics (Third Year-Part A), The National Publishing Company, Madras, 2001.

Reference Book:

1. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Lakshmi Publications, New Delhi, 2007.

T108 MATERIAL SCIENCE

UNIT I

Crystal Structure and Defects: Crystal Systems – Bravais Lattices – Coordination Number, Atomic Radius, Packing Factor for FCC & HCP structures – Miller Indices for a cubic crystal– Powder X Ray Diffraction Method - Lattice defects – Qualitative ideas of point, line, surface and volume defects

UNIT II

Dielectric Properties: Dielectric Polarization and Mechanism – Internal or local Field - Clausius-Mossotti relation – Dielectric loss - Temperature and frequency dependence of dielectric constant – Measurement of Dielectric constant and loss using Scherring bridge – Elementary ideas of Piezoelectrics, Ferroelectrics and Pyroelectric materials and its Applications

UNIT III

Magnetic Properties: Elementary Ideas of classification of magnetic materials (Dia, Para, Ferro & Ferri) – Quantum theory of Para & Ferro Magnetism – Domain Theory of Hysteresis – Heisenberg Theory of Exchange Interaction (without derivation) – Qualitative ideas of Anti ferromagnetic Ordering – Structure and Properties of Ferrites – Properties of Soft & Hard Magnetic Materials – Applications: floppy disks, CD ROM, Magneto optical recording

UNIT IV

Semiconductors and Superconductors: Derivation of Carrier concentration in intrinsic Semiconductor – Hall effect in Semiconductors -- Application of Hall Effect - Basic Ideas of Compound Semiconductors (II-VI & III-V) - Basic concepts of superconductivity – transition temperature – Meissener effect – Type I and II superconductors – high temperature superconductors – 123 superconductor.

UNIT V

Advanced Materials: Liquid Crystals – Types – Application as Display Devices – Metallic Glasses – Nanomaterials (one, Two & three Dimensional) – Physical Properties and Applications of Carbon Nano Tubes

Text books:

1. V Raghavan , Materials Science and Engineering- A First Course, PHI Learning, 2008.
2. M Arumugam , Materials Science, Anuratha Printers, 2004.

Reference Books:

1. M Ali Omar, Elementary Solid State Physics, Addison Wesley Publishing Co., 2000.
2. William D Callister Jr., Material Science and Engineering, John Wiley and sons, 2006.
3. Srivatsava J P, Elements of Solid State Physics, PHI Learning, 2001.
4. Charles Kittel, Introduction to Solid State Physics, John Wiley & sons, Singapore ,2007.
5. S.O Pillai , Solid State Physics– New Age International,2005.
6. Charles P Poole and Frank J Owens, Introduction to Nanotechnology, Wiley Interscience, 2003.

T109 ENVIRONMENTAL SCIENCE

UNIT I

Environmental Segments and Natural Resources: Environmental segments-lithosphere, hydrosphere, biosphere and atmosphere-layers of atmosphere. Pollution-definition and classification. Pollutants-classification.Forest resources-use and overexploitation, deforestation, forest management. Water resources-sources, use and conflicts over water, dams-benefits and problems. Mineral resources-mineral wealth of India, environmental effects of extracting and using mineral resources. Food resources-world food problems, environmental impact of modern agriculture-fertilizer and pesticides, overgrazing and land resources-land degradation- land slides, soil erosion and desertification. Energy resources-growing energy needs renewable and non-renewable energy resources and use of alternate-energy sources.

UNIT II

Ecosystem and Biodiversity: Concept of an ecosystem-structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of forest, grass land, desert and aquatic (fresh water, estuarine and marine) ecosystem. Biodiversity-definition-genetic species and ecosystem diversity. Value of biodiversity – consumptive use, productive use, social, ethical, aesthetic and option values. Hot spots of biodiversity. Threats to biodiversity-habitat loss, poaching of wild life, human-wildlife conflicts. Endangered and endemic species. Conservation of biodiversity-in situ and ex-situ conservation of biodiversity.

UNIT III

Air Pollution: Air pollution-sources of air pollution. Sources, effects and control measures of oxides of nitrogen, oxides of sulphur, oxides of carbon, hydrocarbon, chlorofluro carbons and particulates. Green house effect-causes and effects on global climate and consequences. Ozone depletion-causes, mechanism and effect on the environment. Smog-sulfurous and photochemical smog-effect on the environment. Acid rain-theory of acid rain and effects.

UNIT IV

Water Pollution and Solid Waste Management Sources: effects and control measures of –water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and radioactive pollution. Solid waste management – causes, effect and control measures of urban and industrial wastes.

UNIT V

Social Issues and the Environment: From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, water shed management. Resettlement and rehabilitation of people. Environmental ethics. Consumerism and waste products. Environmental protection act-air (prevention and control of pollution) act, water (prevention and control of pollution) act, wildlife protection act, forest conservation act. Role of an individual in prevention of pollution.

Human population and the environment-population growth, variation among nations, population explosion, role of information technology in environment and human health.

Text Books:

1. K. Raghavan Nambiar, "Text Book of Environmental Studies" 2nd edition, Scitech Publications, India, Pvt. Ltd, Chennai, 2008.
2. A. K. De, "Environmental chemistry" 6rd edn; New age international (P) Ltd, New Delhi, 2006.

Reference Books:

1. B.K. Sharma, "Environmental chemistry" goel publishing house, Meerut, 2001.
2. G. S. Sodhi, Fundamental concepts of environmental chemistry, Narosa publishing house, New Delhi
3. S .S.Dara, " A text book of environmental chemistry and pollution control, S. Chand and Company Ltd, New Delhi, 2002.
4. Richard T. Wright, environmental science, 9th edition, Pearson education inc, New Delhi, 2007
5. P. Meenakshi, "Elements of environmental science and engineering" PHI Learning, New Delhi, 2006.

T104 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

PART A – ELECTRICAL

UNIT – I

Review of Kirchoff's laws - series and parallel circuits, equivalent resistance, star/delta conversion. Concepts of AC circuits – rms value, average value, form and peak factors – real and reactive power – power factor.

UNIT – II

Node and mesh methods of analysis of DC circuits and simple AC circuits - Introduction to three phase circuits, Introduction to three phase system - phase and line parameters – relations, power measurement – voltmeter and ammeter method, two and three wattmeter methods.

UNIT – III

Principle of DC generator and motor - Transformer, synchronous generator, induction motor (single phase). Sources for electrical energy conversion-thermal and hydraulic plant (Block diagram approach only). Components of AC transmission and distributions systems – line diagram.

PART B – ELECTRONICS

UNIT – IV

Half-wave rectifier and Full-wave rectifier- filters - Amplifiers-common emitter and common collector amplifiers- Hartley oscillator and RC phase shift oscillator.

Transducers – Resistance temperature detector (RTD) – Linear variable differential transformer (LVDT) - Strain gauge – Piezo electric transducer.

UNIT - V

Boolean algebra – Reduction of Boolean expressions – De-Morgan's theorem – Logic gates – Implementation of Boolean expressions – Flip flops – RS, JK, T and D. Combinational logic – Half adder, Full adder and Subtractors. Sequential logic – Ripple counters and shift registers.

UNIT - VI

Model of communication system – Analog and digital – Wired and wireless channel. Block diagram of various communication systems – Microwave, satellite, optical fiber and cellular mobile system. Network model – LAN, MAN and WAN – Circuit and packet switching – Overview of ISDN.

Text Books

1. Hughes revised by John Hiley, Keith Brown, Ian McKenzie Smith, Electrical and Electronics Technology, Pearson Education Limited, New Delhi, 2007.
2. Smarajit Ghosh, Fundamentals of Electrical and Electronics Engineering, Second Edition, PHI Learning, 2007.
3. George Kennedy and Bernard Davis, Electronics communication Systems, Tata McGraw-Hill Ltd, New Delhi, 2007.

Reference Books

1. D.P.Kothari and I.J.Nagrath, Theory and Problems of Basic Electrical Engineering,
PHI Learning., New Delhi.
2. J.B.Gupta, A Course in Electrical Power, Katson Publishing House, New Delhi,

T105 THERMODYNAMICS

UNIT I

Basic Concepts and Definitions: Energy conversion and efficiencies - System, property and state - Thermal equilibrium - Temperature - Zeroth law of Thermodynamics.

UNIT II

First Law of Thermodynamics: The concept of work and adiabatic process - First law of thermodynamics - Conservation of Energy principle for closed and open systems - Calculation of work for different processes of expansion of gases

UNIT III

Second Law of Thermodynamics: Equilibrium and the second law - Heat engines - Kelvin-Planck statement of second law of thermodynamics - Reversible and irreversible processes - Carnot principle - Clausius inequality- Entropy

UNIT IV

Gas Power Cycles: Air standard cycles: The air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Bryton cycles and their efficiencies

UNIT V

Refrigeration Cycles and Systems: Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems (only theory) - Gas refrigeration cycle - Absorption refrigeration system (only theory)- Liquifaction and solidification of gases

Text Books:

1. Nag, P. K., "Engineering Thermodynamics", 4th edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi,1995.
2. Wark, K., "Thermodynamics", 4th edition, McGraw Hill, N.Y.,1985

Reference Books :

1. Arora, C.P., "Thermodynamics" , Tata McGraw Hill Publishing Co. Ltd., New Delhi,1998.
2. Burghardt, M.D., "Engineering Thermodynamics with Applications", 4th edition, Harper and Row, N.Y., 1986.
3. Huang, F.F., "Engineering Thermodynamics" 2nd edition , Macmillan Publishing Co. Ltd., N.Y.,1989.
4. Cengel, Y.A. and Boles, M.A., "Thermodynamics - An Engineering Approach", 5th edition, McGraw Hill, 2006

T106 COMPUTER PROGRAMMING

UNIT – I

History of Computers – Block diagram of a Computer – Components of a Computer system – Classification of computers - Hardware – Software – categories of Software – Operating System – Applications of Computers - Role of Information Technology – Internet and its services – Intranet – Study of word processor – Preparation of worksheets

UNIT – II

Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code.

Introduction to C – C tokens – data types – Operators and expressions – I/O functions

UNIT – III

Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursion – Passing array to functions

Storage classes – Strings – String library functions

UNIT – IV

Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types– Union

Pointers – pointers and arrays – pointers and functions - pointers and strings - pointers and structures

UNIT – V

Files – operations on a file – Random access to files – command line arguments

Introduction to preprocessor – Macro substitution directives – File inclusion directives – conditional compilation directives – Miscellaneous directives

Text Books

1. Ashok N Kamthane, "Computer Programming", Pearson education, Second Impression, 2008.
2. K. Venugopal and C.Kavichithra, "Computer Programming", New Age International Publishers, First Edition, 2007.

Reference Books

1. Balagurusamy. E, "Programming in ANSI C", Tata McGraw Hill, Third edition, 2006.

P101 COMPUTER PROGRAMMING LAB

List of Exercises

OS Commands, Word Processor and Spreadsheets

1. Study of OS commands-Compilation and execution of simple C programs
2. Use of mail merge in word processor
3. Use of spreadsheet to create Charts(XY, Bar, Pie) and apply the formulae wherever necessary C Programming (Flowcharts and algorithms are essential for the programming exercises)
4. Greatest of three numbers using conditional operator and if statement
5. Read two numbers and swap those two numbers using temporary variable and without using temporary variable.
6. Solve quadratic equation for different sets of inputs.
7. Use of Switch….Case statements
8. Generation of prime and Fibonacci series
9. Evaluate the COSINE series using for, while and do..while loops
10. Matrix operations

1. Addition
2. Transpose
3. Multiplication

11. Evaluate the sin(x) series using functions and recursive functions
12. Read a string and find solution to remove the duplicates of a given string from the given sentence

Create an array of structures for a list of items with the following details

Item_Code	Item_ Name
102	Paste – Colgate
102	Paste –Pepsodent

102	Paste –Close-up
101	Soap-Cinthol
101	Soap-Lux
101	Soap-Hamam
101	Soap-Dove

Arrange the set of items in ascending order of its Item_Code and descending order of its Item_ name as given below

Item_Code	Item_ Name
101	Soap-Lux
101	Soap-Hamam
101	Soap-Dove
101	Soap-Cinthol
102	Paste –Pepsodent
102	Paste –Colgate
102	Paste – Close-up

14.Use of Structure to define a user defined data types, input the data and write the data into the file

15.Use of pointers and array of pointers

16.Functions with static data types

17.Write command line program to implement the following DOS commands using files

- Del
- Copy

P102 ENGINEERING GRAPHICS

Unit 0
Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning

Unit I
Conic sections, Involutes, Spirals, Helix. Projection of Points, Lines and Planes

Unit II
Projection of Solids and Sections of Solids.

Unit III
Development of surfaces - Intersection of surfaces (cylinder-cylinder, cylinder-cone)

Unit IV
Isometric projections and Orthographic projections

Unit V
Computer Aided Drafting: Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands (Auto CAD) for simple shapes - Dimensioning.

Text Books

1. K.R. Gopalakrishna and Sudhir Gopalakrishna, Engineering Graphics, Inzinc Publishers, 2007.
2. K.V. Natarajan, A Text Book of Engineering Drawing, Dhanalakshmi Publishers, 2006.
3. BIS, Engineering Drawing practice for Schools & College, 1992.

Reference Books

1. N.D. Bhatt, Engineering Drawing, 49th edition, Chorotar Publishing House, 2006.
2. K. Venugopal, Engineering Drawing and Grahics + Auto CAD, 4th edition, New Age International Publication Ltd., 2004 .
3. David I cook and Robert N Mc Dougal, Engineering Graphics and Design with computer applications, Holt – Sounders Int. Edn. 1985.
4. James D Bethune and et. al., Modern Drafting, Prentice Hall Int., 1989.

P103 BASIC ELECTRICAL AND ELECTRONICS LAB

ELECTRICAL LAB

1. Study of tools and accessories
2. Study of joints
3. Staircase wiring
4. Doctor's room wiring
5. Godown wiring
6. Tube Light and Fan connection
7. Lamp controlled from three different places-wiring

ELECTRONICS LAB

1. Rectifiers

Construction of half wave and full wave rectifiers with and without filters – Calculation of ripple factors.

2. Frequency Response of RC Coupled Amplifiers

Determination of frequency response of given RC coupled amplifier - Calculation of bandwidth.

3. Verification of Kirchoff's Voltage and Current Laws

Determine the voltage and current in given circuits using Kirchoff"s laws theoretically and verify the laws experimentally.

4. Study of Logic Gates
    1. Verification of Demorgan's theorems
    2. Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR, EX-NOR gates and Flipflops - JK, RS, T and D
    3. Implementation of digital functions using logic gates

5.Study of CRO
    1. Measurement of AC and DC voltages
    2. Frequency and phase measurements (using Lissajou's figures)

6.Study of Transducers
    1. Displacement and load measurements with transducers
    2. Temperature measurement with thermocouple

P107 NCC / NSS

NCC/NSS training is compulsory for all the Undergraduate students

1. The above activities will include Practical/field activities/Extension lectures.
2. The above activities shall be carried out outside class hours.
3. In the above activities, the student participation shall be for a minimum period of 45 hours.
4. The above activities will be monitored by the respective faculty incharge and the First Year Coordinator.
5. Pass /Fail will be determined on the basis of participation, attendance, performance and behaviour. If a candidate Fails, he/she has to repeat the course in the subsequent years
6. Pass in this course is mandatory for the award of degree.

MA T31 MATHEMATICS-III
(Common to ALL Branches)

UNIT-I

LAPLACE TRANSFORM: Definitions-Laplace transform of unit impulse and step functions-Laplace transform of periodic functions-Exponential shift formula-Initial and final value theorems-Laplace transform of derivatives and integrals- convolution theorem-Inverse Laplace transform-Methods of determining inverse Laplace Transform-Solution of linear differential equations using Laplace transforms (12 hours).

UNIT – II

Function of a Complex Variable: Functions of a complex variable-continuity, Derivative and analytic function-Cauchy-Riemann equations-Necessary and sufficient conditions for analyticity-Harmonic and orthogonal properties of real and imaginary parts-Conformal mapping-Bilinear transformations (12 hours).

UNIT – III

COMPLEX INTEGRATION: Cauchy's theorem-Cauchy's integral formula-Taylor's and Laurent series-Residue theorem-Contour integration round the unit circle and semicircular contour (12 Hours).

UNIT – IV

FOURIER SERIES: Dirichlet's conditions-Expansion of periodic functions into Fourier series-Change of interval-Half-range Fourier Series.
Complex form of Fourier series-Root mean square value-Parseval's theorem on Fourier coefficients-Harmonic analysis (12 Hours).

UNIT – V

FOURIER TRANSFORM: Fourier integral (statement only), Fourier transform, Inverse Fourier Transform, Fourier sine and cosine transforms, definitions and properties. (12 hours)

TEXT BOOK:

1.M.K. Venkataraman, Engineering Mathematics, Vol. II, National Publishing co. Madras, 2009 (For units I, II, and III).
2.M.K. Venkataraman, Engineering Mathematics, Vol. III, National Publishing co. Madras, 2009 (For units IV and V).

REFERENCE BOOKS:

1. N.P.Bali & Manish Goyal: A text book of Engineering Mathematics, Laxmi Publications, NewDelhi, 2008
2. Erwin Kreyszig: Advanced Engineering Mathematics, John-Wiley sons, NewYork, 2005.
3.B.S.Grewal : Engineering Mathematics, Khanna Publishers, New-Delhi, 2008

EI T32 ELECTRIC CIRCUIT ANALYSIS
(Common to ICE and BME branches)

UNIT 1

BASICS OF CIRCUIT ANALYSIS: Review of active and passive elements-Voltage–Current relationship for passive elements-Review of Kirchhoff's laws- network reduction techniques- series, parallel, series parallel circuits.

Review of fundamentals of ac circuits, inductance and capacitance parameters, Concept of Reactance, Impedance, Susceptance and Admittance, Steady state analysis of R, L and C (in series, parallel and series parallel combinations) with sinusoidal excitation- power factor, Real and Reactive powers, Complex and Polar forms of representation, Complex power.

Definitions – Graph – Tree, Basic cut-set and Basic Tie-set matrices for planar networks – Loop - Duality & Dual networks.

UNIT II

NETWORK THEOREMS FOR DC AND AC CIRCUITS: Review of loop and nodal methods of analysis, star-to-delta or delta-to-star transformation, Source transformation

Superposition theorem, Thevenin's theorem, Norton's theorem, reciprocity theorem, compensation theorem, Maximum power transfer theorem, Millman's theorem and Tellegen's theorem.

UNIT – III

COUPLED CIRCUITS, RESONANCE AND THREE PHASE CIRCUITS:

Resonance – Series and parallel resonance circuits- Concept of band width and Q factor.

Coupled Circuits: Faraday's laws of electromagnetic induction – Concept of self and mutual inductance – dot convention – coefficient of coupling- linear transformer- Ideal transformer

Three phase circuits: Phase sequence – Star and delta connection – Relation between line and phase voltages and currents in balanced systems – Analysis of balanced and Unbalanced 3 phase circuits – two watt meter method to measure power and power factor.

UNIT – IV

TRANSIENT ANALYSIS: Initial conditions in elements-Evaluating initial conditions in networks-Transient response of R-L, R-C, R-L-C circuits (Series combinations only) for impulse, step, pulse and sinusoidal excitations -Solution using differential equation approach and Laplace transform methods of solutions- Response of circuits for non-sinusoidal periodic inputs

UNIT – V

NETWORK FUNCTIONS AND PARAMETERS: Network functions: The concept of complex frequency-Transform impedance and transform circuits- driving point impedance and admittance-transfer function-poles and zeros.

Two port network parameters – Z, Y, ABCD, hybrid parameters and their relations– concept of transformed network – 2-port network parameters using transformed variables.

TEXT BOOKS:

1. P. Ramesh Babu "Circuit Analysis" Scitech publications Pvt. Ltd, Second edition, 2009

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REFERENCE BOOKS:

1. William Hayt and Jack E. Kimmerly, "Engineering circuit analysis" McGraw Hill Company, 6^{th} edition.
2. N.C. Jagan & C.Lakshminarayana, 'Network Theory' B.S Publications, 2006.
3. Kuriakose, "Circuit Theory", PHI Learning, 2005

EI T33 ELECTRON DEVICES AND CIRCUITS
(Common to ICE and BME branches)

UNIT- I

JUNCTION DIODE CHARACTERISTICS : Review of semi conductor Physics – n and p –type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Open-circuited p-n junction, The p-n junction as a rectifier (forward bias and reverse bias), The current components in p-n diode, Law of junction, Diode equation, Energy band diagram of p-n diode, Volt-ampere characteristics of p-n diode, Temperature dependence of V-I characteristic, Transition and Diffusion capacitances, Breakdown Mechanism in Semi Conductor Diodes, Zener diode characteristics.

UNIT- II

BIPOLAR JUNCTION AND FIELD EFFECT TRANSISTORS: Construction, principle of operation, V-I characteristics, symbol, equivalent circuit, parameter calculations, applications, and specifications of BJT, FET and MOSFETS. Enhancement and Depletion mode MOSFET, Salient features of different configuration of BJT and FET- VVR operation of FFT-Comparison of BJT, JFET and MOSFET. devices.

UNIT- III

RECTIFIERS, FILTERS AND REGULATORS : Half wave rectifier, ripple factor, full wave rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, π- section filter, Multiple L- section and Multiple π-section filter and comparison of various filter circuits in terms of ripple factors, clippers, clampers, voltage multipliers.

Simple circuit of a regulator using zener diode. Series and Shunt voltage regulators-Analysis and design- Protection circuits for voltage regulators.

UNIT IV

SPECIAL SEMICONDUCTOR DEVICES: Tunnel diode and characteristics- PIN diode- Varactor diode- Schottky diode- Gunn diode- Laser diode- photo conductive sensors- photo voltaic sensors- Light Emitting Diode (LED)- Liquid Crystal Display (LCD)- Charge coupled device (CCD)- Silicon Control Rectifier (SCR)- two transistor equivalent, DIAC, TRIAC, Applications of SCR, DIAC, TRIAC, Unijunction Transistor (UJT).

UNIT-V

BIASING AND STABILISATION : BJT biasing- DC equivalent model-Criteria for fixing operating point- Methods of Bias stabilization, fixed bias, emitter bias , voltage divider bias, DC bias with voltage feedback –Temperature compensation using diode biasing,thermistor and sensistor compensation-Thermal run away-Thermal stability, Biasing of JFET and MOSFET-uses of heat sink.

AMPLIFIERS: Small signal low frequency transistor amplifier circuits: h-parameter representation of a transistor, Analysis of single stage transistor amplifier using h-parameters: voltage gain, current gain, Input impedance and Output impedance. Comparison of transistor configurations in terms of A_I , R_i , A_v , R_o.

TEXT BOOK

1. J.Millman, C.C.Halkias, and Satyabratha Jit, "Electronic Devices and Circuits"Tata McGraw Hill, 2nd Ed., 2007.

REFERENCE BOOKS

1. R.L. Boylestad and Louis Nashelsky , Electronic Devices and Circuits , Pearson/Prentice Hall, 9th Edition,2006.

2. P. Ramesh Babu, "Electronic Devices and Circuits" Scitech Publications Pvt, Ltd., 2008

3.Nagrath, ""Electronic Devices and Circuits" PHI Learning, 2006

EI T34 SWITCHING THEORY AND LOGIC DESIGN
(Common to ICE and BME branches)

UNIT I

NUMBER SYSTEMS & CODES : Review of number systems: binary, octal and hexadecimal– complement representation of negative numbers-BCD, ASCII, EBCDIA weighted and self complimentary codes-Excess -3 –gray code- error detecting & error correcting codes –hamming codes-parity generation and detection.

BOOLEAN ALGEBRA AND SWITCHING FUNCTIONS : Review of logic gates-– universal gates- NAND/NOR realizations- Boolean Algebra - Basic theorems and properties - switching functions–Simplification of Boolean expression-sum of products and product of sums, Karnaugh map-Quine McClusky's method.

INTEGRATED CIRCUITS: Classification of ICs-Comparison of various logic families, standard TTL NAND Gate-Analysis& characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs, IC interfacing- TTL driving CMOS & CMOS driving TTL .

UNIT II

COMBINATIONAL LOGIC DESIGN:

Design using conventional logic gates, half adder, full adder, half subtractor, full subtractor, magnitude comparator, Encoder, Decoder, Multiplexer, De-Multiplexer, MUX Realization of switching functions, Parity bit generator, Code-converters, Hazards and hazard free realizations.

Study of pin configurations of TTL- 74XX and CMOS 40XX series for the above combinational circuits, decoders & drives for LED & LCD display.

UNIT III

SEQUENTIAL CIRCUITS : Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples) Basic flip-flops-truth table and excitation table, synchronous and asynchronous counter design-up-down counter, BCD counter- Design of modulo-N Ring & Shift registers-timing sequence-tracing problems-Hazard and hazard free asynchronous counters.

UNIT IV

DESIGN OF SEQUENTIAL CIRCUITS: basic models of sequential machines-concept of state diagram –design with state equations –simple circuit implementations.

Design of synchronous counters. Decade counter, shift registers & applications- Study of pin configurations of TTL- 74XX and CMOS 40XX series for the above sequential circuits.

UNIT V

ALGORTHMIC STATE MACHINES : Salient features of the ASM chart-Simple examples-System design using data path and control subsystems-control implementations-examples of Weighing machine and Binary multiplier.
PROGRAMMABLE LOGIC DEVICES, THRESHOLD LOGIC : Basic PLD's-ROM, PROM, PLA, PLD Realization of Switching functions using PLD's. Capabilities and limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

TEXTBOOKS:

1. Morris Mano, Digital Design –, PHI, 3rd Edition, 2006.
2. Anand Kumar, Digital Electronics, PHI, 2008

REFERENCE BOOKS:

1. Zvi Kohavi, Switching & Finite Automata theory –TMH, 2nd Edition.
2. Fletcher, An Engineering Approach To Digital Design –PHI.

EI T35 C++ AND DATA STRUCTURES
(Common to ICE and BME branches)

UNIT – I

INTRODUCTION TO DATA STRUCTURES – Abstract data types – Arrays – Static, Dynamic and Generic arrays. Strings – Fixed and variable size – static and dynamic strings.

UNIT – II

LINKED LISTS – Dynamic storage management – singly and doubly linked list – Stack –Application of stack – Fixed, variable and Generic stack – queues – queue based on Dynamic linked list – Trees – Binary Trees – Graphs – Warshall's Algorithms – Shortest paths.

UNIT – III

OBJECTS ORIENTED PROGRAMMING – objects and classes – methods, messages, encapsulation, abstraction, inheritance, polymorphism, dynamic building. Traditional approach Versus object orientation; benefits of object orientation – flexibility in software development – reusability – extensibility – maintainability.

UNIT – IV

OBJECTS AND CLASSES – specifying classes – using – C++ objects and data types – constructors and destructors – object as function arguments – structures and classes. Array fundamentals – array as class member data – array of objects. Structures – simple structure – accessing structure member – structure within structure – structure and classes – Function overloading – Inline function – Virtual function and polymorphism.

UNIT – V

OPERATOR OVERLOADING – overloading unary operator – overloading binary operator – data conversion. Inheritance – derived class and base class – derived class constructors –
public and private inheritance – level of inheritance. C++ graphics – text – mode graphics functions – graphics – mode graphics functions – colors – rectangles and lines – polygons and inheritance – text in graphics mode – Addresses and pointers, Simple file operations: streams – string I/O – character I/O.

TEXT BOOKS:

1. N.S. Kutti and P.Y. Padhye ,"Data Structures in C++" ,Prentice Hall of India Pvt., Ltd., New Delhi 2001.
2. Liberty & Keogh, "C++: An introduction to programming", Prentice Hall of India Pvt., Ltd., New Delhi 2002.

REFERENCES:

1. Bjarne Stroustrup, " The C++ Programming Lenguage", Addison Wesley by publication, New york 1994.
2. Jean – Paul Tremblay and Paul G.Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw Hill 1998.
3. E. Balagurusamy, "Object oriented Programming with C++", Tata McGraw Hill, New Delhi, 1996.

EI T36 FLUID MECHANICS AND STRENGTH OF MATERIALS
(Common to ICE and BME branches)

Unit I

DEFORMATION OF SOLIDS AND BENDING OF BEAMS: Concept of stress and strain – Normal and shear stresses – Simple and compound Stresses - Elasticity and elastic moduli – Poisson's ratio – Concept of Shear Force and Bending Moment – Bending moment and shear force diagrams for simply supported, cantilever and over hanging beams.

UNIT II

SHAFTS AND SPRINGS: Torsion – Shear stresses in circular solid and hollow shafts - Torque and power – Helical and leaf springs – Load, deflection, stress and stiffness relationships.

Unit III

FLUID PROPERTY AND FLOW CHARACTERISTICS : Fluid Property - Newton's law of Viscosity – Fluid pressure and its measurement – Types of Flow– Reynolds number – Continuity equation - Euler's Equation of Motion.

Unit IV

FLOW DYNAMICS AND PIPE FLOW: Bernoulli's Equations –Venturi meter and orifice meter - Pressure losses along the flow –Major and minor losses - Flow through circular pipes – Friction factor – Pipes in series and parallel - Hydraulic gradient.

Unit V

TURBINES AND PUMPS: Introduction and Classification of Turbines – Specific Speed – Turbine characteristics, Speed Governance – Classification of Centrifugal Pumps – Pump characteristics – Efficiency – Reciprocating Pumps –Air vessels.

TEXT BOOKS:

1.R. K. Rajput, Strength of Materials, S. Chand & Company Ltd., 2008.

2. R. K. Rajput, Fluid Mechanics and Hydraulic Machineries, S. Chand & Company Ltd., 2008

REFERENCE S:

1. R.K., Bansal, Strength of Materials, M/s. Lakshmi Publications (P) Ltd, 2008.

2. R.K., Bansal, A text book on Fluid Mechanics & Hydraulic Machinery,- M/s. Lakshmi Publications (P) Ltd, 2008.

3. Srivatsav, "Strength of materials" PHI Learning, 2007

EI P31 ELECTRON DEVICES AND CIRCUITS LAB
(Common to ICE and BME branches)

Any ten experiments

1. PN Junction diode and Zener diode characteristics
2. FET characteristics
3. SCR, DIAC and TRIAC characteristics
4. Measurement of h parameters of transistor in CB, CE, CC configurations
5. Rectifier with and without filters (Full wave & Half wave)
6. CE Amplifier and CC amplifiers
7. Single stage R-C coupled Amplifier.
8. FET amplifier (Common Source)
9. Wien Bridge and RC Phase Shift Oscillators
10. Hartley and Colpitts Oscillators.
11. Clippers and Clampers
12 . RC wave shaping circuits

EI P32 FLUID MECHANICS AND STRENGTH OF MATERIALS LAB
(Common to ICE and BME branches)

List of Experiments:

Part – A: Fluid Mechanics Laboratory

1.Determination of Coefficient of discharge of Venturimeter, Orifice meter, Mouthpiece and Orifice.
2.Determination of Losses through pipes and pipe specials.
3.Determination of metacentric height of floating bodies.
4.Determination of force due to impact of jet on Vanes
5.Characteristic study on turbines
6.Characteristic study on pumps.

Part – B: Strength of Materials Laboratory

1.Tension test and Young's modulus of steel.
2.Hardness test : Rockwell, Brinell and Vicker's.
3.Torsion test : Rods and Flats.
4.Impact test : Charphy and Izod on metals.
5.Ductility test : Sheet metals (AI,GI and MS)

EI P33 C++ AND DATA STRUCTURES LAB
(Common to ICE and BME branches)

1. Programming using keywords of C++: public, Private, Protected.
2. Programming using keywords of C++: Inline, new and delete.
3. Programming examples for the following: function over loading.
4. Programming examples for the following: Operator over loading.
5. Programming using information hiding.
6. Programming using polymorphism.
7. Programming using inheritance.
8. Programming using object interface.
9. Programming to illustrate (i) String (ii) linked list.
10. Programming to illustrate (i) Stack (ii) Queues (iii) Trees.

MA T41 MATHEMATICS-IV
(Common to ALL branches)

UNIT – I

PARTIAL DIFFERENTIAL EQUATIONS: Formation by elimination of arbitrary constants and arbitrary functions – general, singular, particular and complete integrals – Lagrange's linear first order equation – higher order differential equations with constant coefficients.

UNIT – II

SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS Method of separation of variables – boundary value problems – Fourier series solutions – transverse vibration of an elastic string.

UNIT – III

FOURIER SERIES SOLUTION: One dimensional heat flow equation – Fourier series solutions for two dimensional heat flow equations under steady steady state conditions – (Cartesian and polar forms).

UNIT – IV

APPLIED STATISTICS: Curve fitting method of least squares – fitting of straight lines, second degree parabolas and more general curves. Test of significance – large samples test for ratio of variances – chi – square test for goodness of fit and independence of attributes.

UNIT - V

SMALL SAMPLES: Test for single mean, difference of means and correlations of Coefficients, test for ratio of variances – chi – square test for goodness of fit and Independence of attributes.

TEST BOOKS:

1. Venkataraman M.K., "Engineering Mathematics", National Publishing Co., Madras, 2006
2. S.C. Gupta and V.K. Kapoor, "Fundamentals of mathematical statistics", Sultan Chand and sons, 1975.

REFERENCES:

1. Erwin kreyszig, "Advance Engineering Mathematics", Wiley Eastern Ltd., 2006.
2. Grewal, D.C., "Higher Engineering Mathematics", Khanna Publishing Delhi 2002.
3. Narayanan.S., Manicavachagam Pillai,T.K., and Ramanaiah.C, "Advanced Mathematics for Engineering Students", Madras, 2006. C. Viswanathan Pvt., Ltd., Madras.

EI T42 ELECTRONIC CIRCUITS
(Common to ICE and BME branches)

UNIT I

TRANSISTOR AND FET AMPLIFIERS : Review of small signal low frequency transistor amplifier circuits: simplified hybrid model of CE,CC,CB configurations. FET and MOSFET Small signal model.(C.G, C.D, C.S configurations), frequency response, gain bandwidth product- multistage amplifiers-cascade and cascode amplifers-Darlington connection. High frequency response of Transistor and FET amplifiers.

DIFFERENTIAL AMPLIFIERS - Common mode and differential mode analysis - DC and AC analysis.

UNIT II

FEEDBACK AMPLIFIERS AND OSCILLATORS: Concept of feedback, Classification of feedback amplifiers, General characteristics of negative feedback amplifiers, Effect of Feedback on Amplifier characteristics, feedback topologies, practical feedback circuits- the oscillator-conditions for oscillations-RC phase shift oscillator –Wien bridge oscillator, Colpitt's oscillator, Hartley oscillator, clap oscillator, frequency and amplitude stability in oscillators, crystal oscillator.

UNIT III

POWER AMPLIFIERS: Class A power amplifier, maximum value of efficiency of Class A amplifier, transformer coupled amplifier, transformer coupled audio amplifier, push pull amplifier, complimentary symmetry circuits (transformerless class B power amplifier), phase inverters, class D operation, class S operation,

UNIT IV

TUNED AMPLIFIERS: Single tuned capacitive coupled amplifier, tapped single tuned capacitance coupled amplifier, single tuned transformer coupled or inductively coupled amplifier, CE double tuned amplifier, application of tuned amplifiers. stagger Tuning, stability considerations, tuned class B and class C Amplifiers, wideband amplifiers, tuned amplifiers.

UNIT V

PULSE CIRCUITS

RC wave shaping circuits-Integrator and differentiator-switching diodes and transistors-storage time-Astable, monostable and bistable multivibrators, Schmitt trigger, voltage/current sawtooth sweeps-fixed amplitude and constant current generators-UJT saw tooth generator-Miller and bootstrap time bases-Multivibrator using negative resistance devices (UJT and tunnel diodes)

TEXT BOOKS :

1. J. Millman and C.C. Halkias, Integrated Electronics, McGraw-Hill, 1972.
2. Theodore F. Bogart Jr., J.S. Beasley and G. Rico, Electronic Devices and Circuits, Pearson Edition, 6th Edition, 2004.

REFERENCES :

1. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits Theory, Pearson/ Prentice Hall, 9th Edition, 2006.
2. Micro Electronic Circuits – Sedra A.S. and K.C. Smith, Oxford University Press, 5th ed.
3. Kumar and Jain, " Electronic devices and Circuits" PHI learning, 2007

EI T43 ELECTRICAL AND ELECTRONIC INSTRUMENTS
(Common to ICE AND BME branches)

UNIT I

MEASUREMENT OF VOLTAGE, CURRENT, POWER AND ENERGY

Galvanometers – Ballistic, D'Arsonval galvanometer – Theory, calibration, application – Principle, construction, operation and comparison of moving coil, moving iron meters, dynamometer, induction type & thermal type meter, rectifier type – Extension of range and calibration of voltmeter and ammeter– Errors and compensation

Electrodynamometer type wattmeter – Theory & its errors – Methods of correction – LPF wattmeter – Phantom loading – Induction type KWH meter – Calibration of wattmeter, energy meter.

UNIT II

POTENTIOMETERS & INSTRUMENT TRANSFORMERS

DC potentiometer – Basic circuit, standardization – Laboratory type (Crompton's) – AC potentiometer – Drysdale (polar type) type – Gall-Tinsley (coordinate) type – Limitations & applications – Magnetic measurements – Ballistic Galvanometer, Grassot flux meter – testing of ring specimen – method of reversal and step by step method – testing of bar specimen – Hopkinson's permeameter – Iron loss measurement by Lloyd Fisher square. AC test on magnetic materials.

C.T and V.T construction, theory, operation, phasor diagram, characteristics, testing, error elimination – Applications.

UNIT III

RESISTANCE AND IMPEDANCE MEASUREMENT

Measurement of low, medium & high resistance – Ammeter, voltmeter method – Wheatstone bridge – Kelvin double bridge – Series and shunt type ohmmeter –High resistance measurement – Megger – Direct deflection methods – Price's guard-wire method – Loss of charge method – Earth resistance measurement.A.C bridges– Measurement of inductance, capacitance – Q of coil – Maxwell Bridge – Wein's bridge – Hey's bridge – Schering bridge – Anderson bridge –Campbell bridge to measure mutual inductance –Introduction to cable fault and eddy current measurement.

UNIT IV

SIGNAL GENERATORS AND ANALYZERS

Sine wave generator – Frequency synthesized sine wave generator – Sweep frequency generator, pulse and square wave generator – Function generator – Wave analyzer – Applications – Harmonic distortion analyzer – Spectrum analyzer – Applications – Audio Frequency generator – Noise generator.

UNIT V

CATHODE RAY OSCILLOSCOPE, RECORDERS AND DISPLAYS

General purpose oscilloscope – Screens for CRT graticules – Vertical & horizontal deflection systems – Delay line – Multiple trace – Dual beam & dual trace – Probes – Oscilloscope techniques – Special oscilloscopes – Storage oscilloscopes – Sampling oscilloscope. X-Y Plottres, magnetic tape recording , direct , FM , digital recording, – Data loggers.

Display devices : LED – LCD – Annunciators, Numerics, Alphanumerics

TEXT BOOKS

1. E.W.Golding & F.C.Widdis, 'Electrical Measurements & Measuring Instruments', A.H.Wheeler & Co, 1994.
2 Albert D. Helfrick & William D. Cooper, 'Modern Electronic Instrumentation & Measurement Techniques', Prentice Hall of India, 2002.

REFERENCE BOOKS

1. Patranabis, "Principles of Electronic Instrumentation" - PHI, 2007
2. B.M.Oliver and J.M.Cage, 'Electronic Measurements & Instrumentation', McGraw Hill International Edition, 1975.
3. Joseph. J. Carr, 'Elements of Electronic Instrumentation & Measurements', III edition, Pearson Education, 2003.
4. A.K. Sawhney, 'Electrical & Electronic Measurements and Instrumentation', Dhanpath Rai & Co (P) Ltd, 2004.

EI T44 SENSORS AND TRANSDUCERS
(Common to ICE branch)

UNIT – I

INTRODUCTION: Generalized scheme of a measurement system – basic methods of measurements- Errors in measurements –types of errors-Statistical analysis of measurement data-mean, standard deviation – probability of errors – Gaussian distribution – probable error, limiting errors. Reliability of measurement systems – failure rate – reliability improvement, Availability, redundancy. Different types of noises in measurements and its Suppression methods.

UNIT - II

STATIC AND DYNAMIC CHARACTERISTICS: Static characteristics of instruments – accuracy, precision, sensitivity, linearity, resolution, hysterisis, threshold, input impedance, loading effect – generalized mathematical model of measurement systems – dynamic characteristics – Modelling of Transducers – operational transfer function – zero, first and second order instruments – impulse, step, ramp and frequency response of the above instruments.

UNIT – III

RESISTANCE TRANSDUCERS: Resistance potentiometer – loading effect – strain gauges – gauge factor – types of strain gauges – rosettes – semiconductor strain gauges – installation of strain gages – strain measuring circuits – resistance thermometers, materials, construction, characteristics – Thermo wells – Thermistors and photo resistors (LDR) – hot wire anemometer – constant current and constant temperature operation – humidity sensors. Signal conditioning circuits for RTD. Thermocouple. Thermistor and strain gage. Linearization techniques for Thermistors.

UNIT – IV

INDUCTIVE AND CAPACITIVE TRANSDUCERS: Induction potentiometers – variable reluctance transducers – Inductive proximity pick up and Capacitive proximity pickup– Synchros – LVDT construction - signal conditioning circuit – applications – RVDT, Magnetostrictive transducer. Capacitive transducers – variable area type – variable air gap type – variable permittivity type – signal conditioning circuit – Blumlein bridge – Capacitor microphone – frequency response. Piezoelectric transducers – piezoelectric crystals – charge amplifier.

UNIT – V

MISCELLINEOUS AND SMART TRANSDUCERS : Accelerometer and Vibrometer – Eddy current transducers. Hall effect transducers – Photo electric detector, different types and characteristics – Optical sensors, IC sensor for temperature –AD 590,LM335. Introduction to fiber optic sensors – Temperature, pressure, flow and level measurement using fiber optic sensors. Intelligent and smart transducers- principle- design approach-interface design, configuration support, communication in smart transducer networks.

Text Books:

1. S.Renganathan, “Transducers Engineering”, Allied Publishers, 1999.
2. John B. Bentley, “Principles of Measurement systems”, Longman Publishers, 1983.

References:

1. J.W. Dally.W.F. Riley and K.G. Mc Connell, “Instrumentation for Engineering measurements”, John Wiley & sons Inc., 1993.
2. C.D. Johnson, “Process control Instrumentation Technology”, PHI, 7thedition,
3. R.K.Jain, “Mechanical measurements”, Khanna Publishers, 2002.

EI T45 LINEAR INTEGRATED CIRCUITS

(Common to ICE and BME branches)

UNIT I

INTEGRATED CIRCUITS : Classification, chip size and circuit complexity, Fundamentals of Monolithic IC technology, basic planar processes, Fabrication of a typical circuit, Active and passive components of ICs, fabrication of FET, Thin and thick film technology.

OPERATION AMPLIFIER: Basic information of Op-amp, ideal and practical Op-amp, Op-amp characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential mode.

UNIT II

OP-AMP APPLICATIONS : Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, Precision rectifiers, log and antilog amplifiers, sample & hold circuits, multipliers and dividers, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrator, Triangular wave generator.

UNIT III

ACTIVE FILTERS, OSCILLATORS AND REGULATORS: Introduction-Low pass and High pass filters- Design of first and second order Butterworth lowpass and high pass filters Band pass, Band reject and all pass filters- Oscillator types and principle of operation – RC, Wien bridge oscillators triangular, saw-tooth, square wave and VCO- Introduction to voltage regulators, features of 723, Three Terminal IC regulators- DC to DC Converter- Switching Regulators-UPS-SMPS.

UNIT IV

TIMERS & PHASE LOCKED LOOPS : Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565-PLL applications, Analog and digital phase detectors.

UNIT V

D-A AND A- D CONVERTERS : Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC, dual slope ADC and Sigma delta ADC. DAC and ADC specifications. DAC 0800 and ADC 0804 pin diagram and applications

TEXT BOOK :

1 D. Roy Chowdhury, “Linear Integrated Circuits” New Age International (p) Ltd, 2nd Ed., 2003.

REFERENCES :

1. R.F. Coughlin & Fredrick F. Driscoll. Operational Amplifiers & Linear Integrated Circuits, PHI, 6th Edition, 2003
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs –PHI, 4th Edition 2004.

EI T46 ELECTRICAL MACHINES
(Common to ICE branch)

UNIT-I

Magnetic Circuit: Magnetomotive force, magnetic field strength-permeability of free space, relative permeability-reluctance-comparison of electric and magnetic circuits-composite magnetic circuit-magnetic leakage and fringing Kirchhoff's Laws for the magnetic circuits-magnetization curve-hysterisis loop-current-ring theory of magnetism-hysterisis loop-minimum volume of a permanent magnet-load line of a permanent magnet-barium ferrite magnets-magnetic field of a long solenoid-magnetic energy in a non-magnetic medium-magnetic pull. Inductance of a coil and factors determining inductance of a coil. Magnetic relays and contactors. Earth leakage circuit breakers.

UNIT-II

DC Machines: Construction details of machine-operation of DC generators-EMF equation- characteristics of different types of generators-commutation-armature reaction-operation of DC motors-torque equation- characteristics of different types of DC motors. Starters-braking and speed control of DC motors. Applications of DC motors and generators, DC Servomotor

UNIT-III

Transformers: Principle-types, general constructional features of single phase and three phase transformers-phasor diagram and equivalent circuit-regulation and efficiency-open circuit and short circuit tests-autotransformers. Application of three phase, single phase and autotransformers.

UNIT-IV

Synchronous Machines: Principle-types and general constructional features-synchronous generators-characteristics-emf equation-armature reaction-regulation-phasor diagram of synchronous motor –V curve – starting methods. Application of synchronous generators and motors.

UNIT-V

Induction Machines: Types- constructional features- equivalent circuit-slip- torque characteristics-starters- braking and speed control methods-principle of operation and types of single phase induction motors. Application of three and single phase induction motors, AC servomotor

TEXT BOOK

1. Edward Hughes, John Hitley Keith Brown, Ian McKerzie Smith, "Electrical Technology", 2007.

2. R.Anandanatarajan, "Electrical Engineering", Scitech Publicatons, Chennai 2009.

REFERENCE BOOK

1. B.L.. Thereja and Thereja "A text book of Electrical Technology"-Vol-I, S.Chand &Co.Ltd.,
2. Stephen. J.Chapman, "Electrical machinery Fundamentals", McGraw-Hill Higher Education, 2004, 4th Edition.
3. Bandhopadyay, " Electrical Machines", PHI, 2005

EI P41 LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB
(Common to ICE and BME)

Part A (IC Application Lab):

1. OP AMP Applications – Adder, Subtractor, Integrator and Differentiator Circuits using IC 741.
2. Active Filter Applications – LPF, HPF (first order)
3. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
4. Function Generator using OP AMPs.
5. IC 555 Timer – Monostable and Astable Operation Circuit.
6. IC 565 – PLL Applications, IC 566 – VCO Applications.
7. Voltage Regulator using IC 723, Three Terminal Voltage Regulators – 7805, 7809, 7912.
8. 4 bit DAC using OP AMP.

Part B

1. D Flip-Flop 7474 and shift registers-7495
2. Decade counter-7490
3. 3-8 Decoder -74138
4. 4 bit Comparator-7485
5. 8 x 1 Multiplexer -74151 and 2x4 Demultiplexer-74155
6. RAM (16x4)-74189 (Read and Write operations)
7. Decoder drives for LED

EI P42 SENSORS AND TRANSDUCERS LAB
(Common to ICE)

1. Characteristic of Temperature transducers (LDR, thermistor and thermocouple).
2. Measurement of Displacement using capacitive transducer, LVDT, inductive transducer and potentiometric transducer.
3. Measurement of strain, Load and Level using strain gauges
4. Measurement of torque and Pressure using strain gauges
5. Measurement of Voltage, current and power using Hall Effect transducer.
6. Characteristics of Optical Transducers (LDR, Phototransistor, Photovoltaic and photoconductive cells)
7. Measurement of speed using Magnetic and photo electric pickup transducers.
8. Ramp response characteristic of filled in system thermometer.
9. Online Modeling of RTD and thermocouple using Data loggers.
10. Characteristics of P/I and I/P converters.
11. Measurement of Pressure and Temperature using ICs (LM 335, and AD 590)
12. Measurement of Position using synchro Transmitter and receiver.

EI P43 ELECTRICAL MACHINES LAB
(Common to ICE)

1. Power measurement using Two wattmeter method for the following:
    a) Load with UPF
    b) Load with Lagging PF
    c) Load with Leading PF
2. OCC of Shunt generator.
3. Predetermination of Transformer parameters.
4. Swinburn's Test.
5. Load test on single phase Induction motor.
6. Blocked rotor test.
7. Load test on single phase Alternator.
8. V-Curves for synchronous motor.
9. Load test on three phase transformer.
10. Load test on shunt motor.
11. Variation of starting torque with rotor resistance of a slip ring induction motor.

EI P 44 PHYSICAL EDUCATION

Physical Education is compulsory for all the Undergraduate students

1. The activities will include games and sports / extension lectures.
2. Two Hrs. / Week will be allocated for physical education in the third and fourth semesters. The student participation shall be for a minimum period of 45 hours in both the semesters put together.
3. These activities will be monitored by the Director of Physical Education.
4. Pass /Fail will be determined on the basis of participation, attendance, and performance. If a candidate Fails, he/she has to repeat the course in the subsequent years
5. Pass in this course is mandatory for the award of degree

MA T51 NUMERICAL TECHNIQUES AND METHODS

UNIT – I

SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATION AND EIGEN VALUE PROBLEM:

Solution of algebraic and transcendental equation by the method of bisection, the method of false position, Newton-Raphson method and Graeffe's Root squaring method. Eigen value problem by power method and Jacobi method.

UNIT – II

SOLUTION OF SYSTEMS OF EQUATIONS AND MATRIX INVERSION: Solution of linear algebraic equation: Gauss and Gauss-Jordan elimination methods- Methods of triangularization and Crout's reduction. Iterative methods: Gauss-Jacobi, Gauss-Seidel and Relaxation methods. Matrix inversion by Gauss-Jordan elimination and Crout's methods.

UNIT – III

INTERPOLATION: Finite Differences, Relation between operators – Interpolation by Newton's forward and backward difference formulae for equal intervals. Newton's divided difference method and Lagrange's method for unequal intervals. Numerical differentiation in one variable. Numerical Integration by Trapezoidal and Simpson's rules with respect to one and two variables.

UNIT – IV

SOLUTION OF ORDINARY DIFFERENTIAL EQUATION: Single step methods: Taylor seriesmethod, Picard's method of successive approximation, Euler and Improved Eulermethods, Runge-Kutta method of fourth order only. Multistep methods: Milne and Adams-Bashforth methods.

UNIT – V

SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS: Solution of Laplace and Poisson equations: Leibmann's iterative method. Diffusion equation: Bender-Schmitt method and Crank-Nicholson implicit difference method. Wave equation: Explicit difference method.

Text Book:

1. P.Kandasamy, K. Gunavathy and K.Thilagavathy, "Numerical Methods", S. Chand & Company Ltd., New Delhi, 2008.

References:

1. P.Kandasamy, "Numerical methods in Science and Engineering", National Publishing Company, Madras, 2008
2. B.S. Grewal, "Numerical methods in Engineering & Science", Khanna Publishers, New Delhi. (Fifth edition 2006).
3. S.Sastry, " Numerical Analysis" PHI, 2006

EI T52 CONTROL SYSTEMS ENGINEERING
(Common to ICE and BME)

UNIT-I

INTRODUCTION: Concepts of control systems- Open loop and closed loop control systems and their differences- Different examples of control systems- classification of control systems.

MATHEMATICAL MODELS OF PHYSICAL SYSTEMS: Differential equations- transfer function and block diagram representation of physical systems- translational and rotational mechanical systems, electrical systems-analogous systems- Block diagram reduction using algebra- Representation by signal flow graph- reduction using Mason's gain formula.

UNIT-II

TIME RESPONSE ANALYSIS: Standard test signals- impulse, step and ramp response analysis of first order and second order systems- Characteristics Equation of Feedback control systems, Transient Response of second order systems- Time domain specifications- Steady state response- Steady state errors and error constants- Effects of proportional derivative, proportional integral systems, performance indices.

UNIT-III

CONCEPTS OF STABILITY: The concept of stability, Routh stability criterion- qualitative stability and conditional stability. The root locus concept- construction of root loci- effects of adding poles and zeros to G(s)H(s) on the root loci-root contour.

UNIT-IV

FREQUENCY RESPONSE ANALYSIS: Frequency response specifications- Bode diagrams- Determination of Frequency domain specifications and transfer function from the Bode diagram- Phase margin and Gain margin- Stability Analysis from Bode plots. Polar plots, Nyquist plots and applications of Nyquist criterion to find the stability- Effects of adding poles and zeros to G(s)H(s) on the shape of the Nyquist diagrams, Constant M and N circles- Nichols Chart- Frequency Domain specifications from Nichols Chart.

UNIT-V

STATE-VARIABLE ANALYSIS: Introduction of state, state variables and state model, derivation of state models from block diagrams, Relationship between state equations and transfer functions- Characteristic equation, eigenvalues, eigenvectors, canonical forms Diagonalization- solving the time invariant state equations- State Transition Matrix. Controllability and observability.

TEXT BOOK:

1. R.Anandanatarajan, P.Ramesh Babu, “Control Systems Engineering”, Scitech Publications, India, Second Edition, 2008.

REFERENCES:

1. J.Nagrath & M.Gopal, “Control System Engineering” Wiley Eastern, 2001

2. Katsuhiko Ogata, “Modern Control Engineering”, PHI Learning, Fourth Edition, 2002.

EI T53 INDUSTRIAL INSTRUMENTATION – I

(Common to ICE)

UNIT – I

INDUSTRIAL MEASUREMENTS : Measurement of straightness, flatness, roundness and roughness. Electric balance – different types of load cells – elastics load cell-strain gauge load cell- different methods of torque measurement, using strain gauge, relative regular twist-speed measurement – revaluation counter-capacitive tacho-drag up type tacho D.C and A.C tacho generators – stroboscopic methods.

UNIT – II

TEMPERATURE MEASUREMENT: Introduction - Definitions and standards – primary and secondary fixed points – Temperature scale – calibration of thermometers – different types of filled in system thermometer – sources of errors in filled in systems and their compensation – Bimetallic thermometers – Electrical methods of temperature measurement – signal conditioning of industrial RTDs and their characteristics – 3 lead and 4 lead RTDs – Improved bridge circuits.

UNIT – III

TEMPERATURE MEASUREMENT- APPLICATIONS : Thermocouples – law of thermocouple – fabrication of industrial thermocouples – signal conditioning of thermocouple output – thermal block references functions – commercial circuits for cold junction compensation – response of thermocouple – Linearization of thermocouple and Thermistors – colour coding Testing and calibration and Installation procedures. Special techniques for measuring high temperature using thermocouples – Radiation methods of temperature measurement – radiation fundamentals – total radiation and selective radiation pyrometers – optical pyrometer – two colour radiation pyrometer.

UNIT – IV

MISCELLINEOUS MEASUREMENTS-I : Accelerometers - LVDT, piezo-electric, strain gauge and variable reluctance type accelerometers – mechanical type vibration instruments – seismic instrument as an accelerometer and vibrometer – calibration of vibration pick ups – units of density, specific gravity and viscosity used in industries – Baume scale API scale – pressure head type densitometer – float type densitometer – ultrasonic densitometer Bridge type gas densitometer.

UNIT – V

MISCELLINEOUS MEASUREMENTS-II : Viscosity terms – say bolt viscometer – rotameter type viscometer – industrial consistency meters – humidity terms – dry and wet bulb psychrometers – hot wire electrode type hygrometer – dew cell – electrolysis type hygrometer – commercial type dew point meter – moisture terms - different methods of moisture measurement – moisture measurement in granular materials, solid penetrable materials like wood, web type material.

TEXT BOOKS:

1. Ernest O.Doebelin, "Measurement systems Application and Design", International Students Edition, IV Edition, McGraw Hill Book Company, 1998.
2. R.K.Jain, "Mechanical and Industrial Measurements", Khanna Publishers, New Delhi, 1999.

REFERENCES:

1. D.Patranabis, "Principles of Industrial Instrumentation", Tata McGraw Hill Publishing Ltd., New Delhi, 1999.
2. A.K.Sawhney, "A course in Electrical and Electronic Measurement and Instrumentation", Dhanpat Rai and Sons, New Delhi, 1999.
3. P.Holman, "Experimental Methods for Engineers", International Student Edition, McGraw Hill Book Company, 1971.

EI T54 MICROPROCESSORS AND ITS APPLICATIONS
(Common to ICE and BME)

UNIT-I

INTRODUCTION TO 8085: Generic-8-bit microprocessor and its architecture-8085 functional block diagram-Architecture-functions of different sections-Memory mapping-Memory interfacing-Instruction format-addressing modes-instruction set of 8085 CPU-instruction cycle-timing diagram-different machine cycles-fetch and execute operations-estimation of execution time.

UNIT-II

PROGRAMMING 8085: Data transfer instructions-arithmetic operations-logic and branch operations-writing assembly language programmes-looping, count indexing-16 bit arithmetic instructions-arithmetic operations related to memory-logical operations, rotate compare, counter and time delays-debugging techniques. Stack- subroutine- call and return instructions-parameter passing techniques-nested subroutine. Parallel input-output and interfacing applications-peripheral and memory mapped I/O

UNIT-III

INTERFACING DEVICES: 8255 programmable peripheral interface-8253 programmable interval timer-8085 interrupts-Restart as software instructions-8259 programmable interrupt controller-direct memory access(DMA) and 8257 DMA controller-8155 and 8255 multipurpose programmable devices-8279 programmable keyboard display interface-serial I/O and data communication-8251 USART-Interfacing data converters ADC and DAC.

UNIT-IV

INTRODUCTION TO 8086: Architecture of 8086 Microprocessor- Special functions of General purpose registers- 8086 flag register and function of 8086 flags- Addressing modes of 8086- Instruction set of 8086-, Assembly language programs involving logical, Branch & Call instructions, sorting, evaluation of arithmetic expressions, string manipulation- Pin diagram of 8086-Minimum mode and maximum mode of operation-Timing diagram- Memory interfacing to 8086 (Static RAM & EPROM).

UNIT-V

APPLICATIONS OF MICROPROCESSORS: Typical application of microprocessors: stepper motor control, temperature control, thermocouple linearization, frequency measurement., phase angle and power factor measurement, Measurement of voltage, current, resistance and power, Measurement of strain, deflection and water level,measurement, Microprocessor based traffic control .

TEXT BOOKS

1. Ramesh S Gaonkar, "Microprocessor Architecture, Programming and application with 8085", 4th Edition, Penram International Publishing, New Delhi, 2000.
(Unit I, II)
2. A.K. Ray and K.M.Burchandi, "Intel Microprocessors Architecture Programming and Interfacing", McGraw Hill International Edition, 2000

REFERENCE BOOKS

1 John Uffenbeck, "The 80x86 Family, Design, Programming and Interfacing", Third Edition, Pearson Education, 2002.
2. B. Ram, "Fundamentals of Microprocessors and Microcomputers, Dhanpat Rai Publications, 2001
3 Mohammed Ali Mazidi and Janice Gillispie Mazidi, "The 8051 Microcontroller and Embedded System", Pearson Education Asia, New Delhi, 2006.

EI T55 MODERN MEASUREMENT TECHNIQUES

UNIT I:

DIGITAL METHODS OF MEASUREMENTS :Review of A/D, D/A techniques – F/V and V/F conversion techniques – Digital voltmeters and multimeters – Automation and accuracy of digital voltmeters and multimeters – Digital phase meters – Digital tachometers – Digital frequency, period and time measurements – Low frequency measurements – Automatic time and frequency scaling – Sources of error – Noise – Inherent error in digital meters, hidden errors in conventional ac measurements – RMS detector in digital multimeters – Mathematical aspects of RMS - Digital storage Oscilloscope.

UNIT II

CURRENT TRENDS IN DIGITAL INSTRUMENTATION: Introduction to special function add on cards – Resistance card – Input and output cards –Digital equipment construction with modular designing; interfacing to microprocessor, micro controllers and computers - Computer aided software engineering tools (CASE) – Use of CASE tools in design and development of automated measuring systems – Interfacing IEEE cards – design of GPIB Systems - Intelligent and programmable instruments using computers-Data networks-CAN Bus, SMART/HART protocols

UNIT III

VIRTUAL INSTRUMENTATION: Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI. VI programming techniques: VIS and sub-VIS, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

UNIT IV

DATA ACQUISITION & VI CHASSIS REQUIREMENTS : Introduction to data acquisition on PC, Sampling fundamentals, Input/Output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements. Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB. Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI. Networking basics for office & Industrial applications, VISA and IVI.

UNIT V

VI TOOLSETS, DISTRIBUTED I/O MODULES: Application of Virtual Instrumentation: Instrument Control, Development of process database management system, Simulation of systems using VI, Development of Control system, Industrial Communication, Image acquisition and processing, Motion control.

TEXTBOOKS:

1. Bouwens, A.J., “Digital Instrumentation”, McGraw Hill, 1984.
2. John Lenk, D., “Handbook of Micro computer based Instrumentation and Control”, PHI, 1984.
3. Gary Johnson, LabVIEW Graphical Programming , Second edition, McGraw Hill, Newyork, 1997.
4. Lisa K. wells & Jeffrey Travis, LabVIEW for everyone, Prentice Hall, New Jersey, 1997.

REFERENCES:

1. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000.

2. Doebelin, ‘Measurement System, Application & Design’, IV Ed, McGraw-Hill, 1990.

EI T56 PROCESS ENGINEERING PRINCIPLES

UNIT-I:

INTRODUCTION - Chemical Process Industries - Batch and Continuous mode of operations – Process Flow Sheets – Material and Energy Balance Principles –
Mass – Mole – Volume Conversions (Ideal Gas Law), Sensible and Latent Heat Calculations, Principles of Momentum, Heat and Mass Transport – Rate Laws (Newton's Law, Fourier's Law, Fick's law), Chemical Reactions – rate and equilibrium, Phase equilibrium, Vapour Pressures and Humidity.

UNIT-II:

FLUID TRANSPORT AND MECHANICAL OPERATION EQUIPMENTS – Laminar and Turbulent flow, Flow Characteristics of fluids – Newtonian and Non-Newtonian, Friction factor, Head loss due to fluid friction pumps – different types, pump characteristics, compressors.Size reduction of solids – crushing (Jaw crusher) and grinding (Ball mill), Size separation (screening), solid – liquid separation – filtration, settling and sedimentation, centrifuge.

UNIT-III:

HEAT TRANSFER EQUIPMENTS – Modes of heat transfer – conduction, convection and radiation, heat transfer without and with phase change (evaporation, condensation), heat transfer coefficient.Heat Exchangers – double pipe and shell and tube, condensers – vertical and horizontal, evaporators – single effect and multiple effect, reboilers

UNIT-IV:

MASS TRANSFER EQUIPMENTS – molecular and turbulent transport of mass – mass transfer coefficient, mass transfer principles in separation, gas – liquid operations – absorption, distillation, humidification – packed and tray towers.Fluid – solid operations – adsorption, drying, leaching, crystallization.
Liquid- liquid operations – extraction.

UNIT-V:

CHEMICAL REACTORS – single and multiple reactions – conversion, yield, selectivity batch and flow reactors(PFR,CSTR), catalyses, multiphase non-catalytic (gas – solid, gas – liquid) and catalytic reactors, fixed bed, fluidized bed, slurry reactors.
Process flow sheets for manufacture of standard chemicals - urea, sugar, crude distillation, cement, paper and pulp.

TEXT BOOKS:

1.Introduction to Chemical Engineering, Walter. L Badger and Julius.T.Banchero, Tata McGraw Hill.

2.'Chemical Reaction Engineering', Octave Levenspiel, Wiley Eastern Ltd., II Edition, 2000.

REFERENCE BOOKS:

1.'Unit operations of chemical engineers', W.L.Mc.Cabe, J.C.Smith and P.Harriot, McGraw Hill International Edition, V edition,1998.

2. 'Chemical Process Industries', N.Shreve,5th edition, McGraw Hill, New York, 1984.

EI P51 SIMULATION LAB

1. Matrix Manipulation, Numerical solution of differential equations using MATLAB software.
2. Time responses of various systems, compensation, Stability analysis using MATLAB.
3. Root locus plots using MATLAB.
4. Relative stability analysis using Nyquist plot.
5. Relative stability analysis using Bode plot.
6. Time domain Analysis using Simulink blocks.
7. Analysis of Transistor biasing circuits (Fixed, Emitter and Collector base bias).
8. Analysis of Transistor Amplifier circuits.
9. Design of filters and resonance circuits.
10. Design and Analysis of Feedback Amplifiers and Oscillators.
11. Analysis of FET biasing and Amplifier circuits.
12. Analysis of cascade amplifiers.

EI P52 DESIGIN PROJECT LAB

1. Design, Testing and calibration of 3½ Digit Digital Voltmeter using ICL 7107.
2. Design, Testing and calibration of Monolithic function Generator using XR 2206.
3. Design, Testing and calibration of Regulator Power supplies.
4. Design, Testing and calibration of Batch counter using TTL ICs.
5. Design ,Testing and calibration of DAC and ADC
6. Design, Testing and calibration of Electronic P, PI, PID and ON/OFF controllers.
7. Design, Testing and calibration of Cold Junction compensation of a Thermocouple.
8. Design, Testing and calibration of Programmable Timers.
9. Design, Testing and calibration of pH meter using single glass electrode.
10. Design, Testing and calibration of Digital Thermometer.

EI P53 MICROPROCESSORS AND APPLICATIONS LAB

1.Programming 8085 microprocessor kit
2.Programming 8086 microprocessor kit
3.Interfacing programmable interrupt controller
4.Interfacing of switches and display devices
5.Interfacing of D/A and A/D converters
6.Interface of key board and display using programmable controllers
7.Interface of programmable timer
8.Stepper motor control using microprocessor
9.Interfacing of 8251 and 8257
10. Study of MASM and DEBUG utilities

EI P54 GENERAL PROFICIENCY-I

UNIT -I :

ART OF COMMUNICATION: Verbal and Non-verbal Communication – Barriers to Communication – Importance of Body Language – Effective Listening – Feedback

UNIT - II :

INTRODUCTION TO SOFT SKILLS: Attitude – Self-Confidence – Leadership Qualities – Emotional Quotient – Effective Time Management Skills – Surviving Stress – Overcoming Failure – Professional Ethics – Interpersonal Skills

UNIT – III :

WRITING: Importance of Writing – Written Vs Spoken Language – Formal and Informal Styles of writing – Resources for improving writing – Grammar and Usage – Vocabulary Building – SWOT analysis

UNIT – IV :

SPEAKING PRACTICE: Dialogue – Telephone Etiquette – Public Speaking – Debate – Informal Discussions – Presentations

UNIT – V :

APTITUDE: Verbal and Numerical aptitude

REFERENCES :

1. Nicholls, Anne. Mastering Public Speaking. Jaico Publishing House,2003.
2. Aggarwal, R.S. Quantitative Aptitude. S.Chand &Co.,2004.
3. Leigh, Andrew and Michael Maynard. The Perfect Leader. Random House Business Books,1999.
4. Whetton .A.David and Kim S. Cameron. Developing Management Skills. Pearson Education, 2007.
5. K.R. Lakshminarayan. Developing Soft Skills. Scitech, 2009.
6. Sherfield M Robert. Developing Soft Skills Pearson Education, 2005.
7. Hair O' Dan, Friedrich W. Gustav and Lynda Dee Dixon. Strategic Communication in Business and the Professions. Pearson Education,2008.
8. Chaney Lilian and Jeanette Martin. Intercultural Business Communication, Fourth Edition. Pearson Education, 2008.

EI T61 PROCESS CONTROL

(Common to ICE)

UNIT – I

PROCESS CHARACTERISTICS: Terms and Objectives, Incentives for process Control – design aspects of a Process Control System- Classification of variables. Process Equation, Process variables, Degrees of freedom. Characteristics of liquid system, gas system, thermal system. Mathematical modelling of processes. Self regulating-Servo and Regulatory, Interacting and Non-Interacting process – Inverse response.

UNIT – II

PROCESS CONTROL ELEMENTS: Signal conversion - I/P, P/I Converters, Pneumatic and Electric actuators, Valve Positioner-Control Valve – Characteristics of Control Valves-Types of control valves- Control valve sizing- cavitation and flashing. Dynamics of batch and Continuous process.

UNIT – III

CONTROLLER: - Basic control actions – Discontinuous control mode, Continuous control mode- Proportional, Single speed floating, Integral and Derivative– Composite control modes – P+I, P+D and P+I+D control modes. Response of controller for different types of test inputs – Integral windup – Auto manual transfer. Selection of control mode for different processes – Typical control schemes for level flow, pressure and temperature.

CONTROLLER TUNING: – Zeigler and Nichols open and Closed loop methods, Performance indices –Based on evaluation criteria – ISE, IAE, ITAE.

UNIT – IV

VARIOUS CONTROL SYSTEMS : Feed Forward Control ,Cascade control , Ratio control, Over ride control, Split range control , Selective control ,Adaptive control, Inferential control.

UNIT V

MULTIVARIABLE CONTROL: Introduction -Control loop interaction –Motivation –General pairing problem- Relative gain array-properties- application of RGA- RGA sensitivity- zeros and performance limitation –scaling consideration-block diagram analysis- decoupling- design of non interacting control loops

Piping and Instrumentation Diagram, Instrument terms and Symbols.

Introduction to Intelligent controllers.

TEXT BOOKS:

1. C.Stephanopoulos, “Chemical process control”, Prentice Hall of India. 1998.
2. Singh, ‘ Process Control” PHI Learning, 2009

REFERENCES:

1. D.P. Eckman, “Automatic Process Control”, Wiley Eastern Ltd., 1972.
2. D.R. Coughanowr, “Process System Analysis and Control”, Second Edition, McGraw Hill 1991.
3. K. Ogata, “Modern Control Engineering”, Prentice Hall of India, 1982.

EI T62 INDUSTRIAL INSTRUMENTATION – II

UNIT – I

LEVEL MEASUREMENT : Gauge glass technique coupled with photo electric readout system – float type level indication – different schemes – level switches level measurement using displacer and torque tube – bubbler system. Boiler drum level measurement – differential pressure method – hydra step systems – electrical types of level gauges using resistance, capacitance, nuclear radiation and ultrasonic sensors.

UNIT – II

PRESSURE MEASUREMENT : Units of pressure – Types of pressure-Non-Electric type pressure measurement – manometers – different types – elastic type pressure gauges – Motion and force balance designs. Bourdon type bellows – diaphragms – Electrical methods – elastic elements with LVDT and strain gauges – capacitive type pressure gauge – piezo resistive pressure sensor – resonator pressure sensor – measurement of vacuum – McLeod gauge – Knudsen gauge – thermal conductivity gauges – Ionization gauge cold cathode and hot cathode types – Electrical pressure transmitter – testing and calibration of pressure gauges – dead weight tester.

UNIT – III

FLOW MEASUREMENT - MECHANICAL TYPE FLOWMETERS: Theory of fixed restriction variable head type flow meters-orifice plate – venturi tube – flow nozzle – dall tube – installation of head flow meters- piping arrangement for different fluids – pilot tube. Positive displacement flow meters – constructional details and theory of operation of mutating disc, reciprocation piston, oval gear and helix type flow meters-inferential meter turbine flow meter – rotameter – theory and installation – angular momentum mass flow meter – coriolis mass flow meters – thermal mass flow meter – volume flow meter plus density measurement – calibration of flow meters – dynamic weighing method.

UNIT – IV

FLOW MEASUREMENT - ELECTRICAL TYPE FLOWMETERS: Electrical type flow meter: Principle and constructional details of electromagnetic flow meter – different types of excitation – schemes used – different types of ultrasonic flow metera-laser Doppler anemometer systems – vortex shedding flow meter – target flow meter – solid flow rate measurement – guidelines for selection of flow meter.

UNIT – V

INDUSTRIAL SAFETY SPECIFICATIONS: EMC: Introduction, Interference coupling mechanism, basics of circuit layout and grounding, concepts of Interfaces, filtering and shielding. Safety: Introduction, electrical hazards, hazardous areas and classification, Non hazardous areas, enclosures – NEMA types, fuses and circuit breakers, protection methods: purging, explosion proofing and Intrinsic safety. Specification of instruments, preparation of project documentation, process flow sheet, Instrument index sheet, Instrument specification sheet, panel drawing and specifications.

TEXT BOOKS:

1. Ernest O.Doebelin, “Measurement systems Application and Design”, International Student Edition, IV Edition, McGraw Hill Book Company, 1998.
2. R.K.Jain, “Mechanical and Industrial Measurements”, Khanna Publishers, New Delhi, 1999.

REFERENCES:

1. D.Patranabis, “Principles of Industrial Instrumentation”, Tata McGraw Hill Publishing Ltd., New Delhi, 1999.
2. Andrew W.G, “Applied Instrumentation in Process Industries – A survey”, Vol. 1 & Vol.2, Gulf Publishing Company, Houston, 1992.

EI T63 COMMUNICATION ENGINEERING

(Common to EEE AND ICE)

UNIT-I

ANALOG MODULATION SYSTEMS: Need for modulation - Amplitude modulation – Frequency spectrum of AM wave – Representation of AM – Power relation –Frequency modulation – Frequency spectrum of FM wave –AM transmitter – FM transmitter – Super heterodyne AM receiver –FM receivers.

UNIT-II

PULSE AND DIGITAL MODULATION SYSTEMS: Principles of pulse modulation – sampling theorem, PAM – PWM – PPM– Conversion of PWM wave to PPM wave – Generation of PAM, PPM and PWM waves – Demodulation of PAM, PWM, PPM – An introduction to digital modulation systems – PCM, ASK, FSK and PSK.

UNIT- III

MICROWAVE AND SATELLITE COMMUNICATION SYSTEMS: *Microwave* communication systems: advantage, block diagram of a microwave radio system, microwave radio stations- Terminal station and repeater station.

Satellite Communication system*:* Satellite Orbits, launch vehicles, look angles, satellite parameters, satellite link model, personal communication systems- GPS services.

UNIT- IV

FIBER OPTICAL COMMUNICATION SYSTEMS: Need for fiber optics, introduction to optical fiber, principle of light transmission through a fiber, fiber characteristics and classification, various fiber losses- Light sources and photo detectors- Block diagram of a fiber optic system- Power budget analysis for a optical link-Recent applications of fiber optics.

UNIT -V

CELLULAR MOBILE COMMUNICATION: Cellular concept, basic cellular concept and its operation, uniqueness of mobile radio environment- Performance metrics in cellular system-Elements of cellular mobile radio-Handoff- Frequency management and channel assignment- Introduction to various cellular standards like AMPS, GSM, GPRS, IS-95A, IS-95B, CDMA-2000 and WCDMA.

TEXT BOOK:

1. Kennedy Davis, “Electronic Communication Systems”, Tata McGraw Hill Publishing Company Limited, New Delhi, 1999.
2. Wayne Tomasi, “Electronic Communication Systems”, Pearson education Private Limited, Delhi, 2004.

REFERENCE BOOKS:

1. Roddy D and Coolen J, “Electronic Communications”, Prentice Hall of India Private Limited, fourth edition, 2007.
2. William C.Y. Lee, “Mobile Cellular Telecommunication Systems”, McGraw Hill International Edition, Second edition, 2006.
3. Gerd Keiser, “Optical fiber Communications”, McGraw Hill International Edition, Foutth edition, 2006.

EI T64 SYSTEM DESIGN USING MICROCONTROLLERS
(Common to ICE)

UNIT I

REVIEW OF MICROCONTROLLERS: Features of Typical Microcontroller – on Board peripherals – Processor Selection criteria – Microcontroller Design Specifications – Word length – Performance Issues - Power consumption – Package Types – Electrical requirements – Reset Hardware – oscillator Design – power Consideration - Development Tools –Firmware Development options – Assembly Language Vs High level Language Programming.

UNIT II

MCS51 MICROCONTROLLER AND INTERFACING: Intel MCS51 Architecture – Derivatives - Special Function Registers (SFR), I/O pins, ports and circuits, Instruction set, Addressing Modes, Assembly Language Programming, Timer and Counter Programming, Serial Communication, Connection to RS 232, Interrupts Programming, External Memory interfacing , Introduction to 16 bit Microcontroller

UNIT III

PIC MICROCONTROLLER AND INTERFACING: Introduction, CPU architecture, registers, instruction sets addressing modes Loop timing, timers, Interrupts, Interrupt timing, I/o Expansion, I 2C Bus Operation Serial EEPROM, Analog to digital converter, UART-Baud Rate-Data Handling-Initialization, Special Features - serial Programming-Parallel Slave Port.

UNIT IV

SOFTWARE DEVELOPMENT AND TOOLS: Embedded system evolution trends. Round - Robin, robin with Interrupts, function-One-Scheduling Architecture, Algorithms. Introduction to-assembler-compiler-cross compilers and Integrated Development Environment (IDE). Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

UNIT V

REAL TIME OPERATING SYSTEMS: Task and Task States, tasks and data, semaphores and shared Data Operating system Services-Message queues-Timer Function-Events-Memory Management, Interrupt Routines in an RTOS environment, basic design Using RTOS. System Design Issues – Design of Industrial Control System.

TEXT BOOK:

1. David E Simon, " An embedded software primer ", Pearson education Asia, 2001.
2. Mohammed Ali Mazidi and Janice Gillispie Mazidi, “The 8051 Microcontroller and Embedded System”, Pearson Education Asia, New Delhi, 2006.

REFERENCES:

1. Burns, Alan and Wellings, Andy, " Real-Time Systems and Programming Languages ", Second Edition. Harlow: Addison-Wesley-Longman, 1997.
2. Raymond J.A. Bhur and Donald L.Bialey, " An Introduction to real time systems: Design to networking with C/C++ ", Prentice Hall Inc. New Jersey, 1999.
3. Grehan Moore, and Cyliax, " Real time Programming: A guide to 32 Bit Embedded Development. Reading " Addison-Wesley-Longman, 1998.
4. Heath, Steve, " Embedded Systems Design ", Newnes 1997.
5. John B Peat man " Design with Microcontroller ", Pearson education Asia, 1998.
6. Jonartthan W. Valvano Brooks/cole " Embedded Micro computer Systems. Real time Interfacing ", Thomson learning 2001.

EI T65 DIGITAL SIGNAL PROCESSING

UNIT – I

DISCRETE-TIME SIGNALS AND LINEAR SYSTEMS

Classification of signals: elementary continuous-time signals, continuous-time periodic signals, representation of discrete-time signals, elementary discrete-time signals, classification of discrete-time signals, sampling and aliasing, Classification of systems: Continuous, discrete, linear, causal, stable, dynamic, recursive, time variance; impulse response and convolution sum, step response, FIR and IIR systems, stable and unstable systems, correlation, time response of discrete-time systems, sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect, Digital signal representation, reconstruction of analog signal, analog to digital conversion.

UNIT- II

DTFT AND Z-TRANSFORM

Discrete frequency spectrum and frequency range, discrete time Fourier Transform (DTFT), properties, frequency response, phase and group delays, ideal filters, Z-transform and its properties, inverse z-transforms; system function, poles and zeros, stability criterion, relationship between s-plane and z-plane Solving difference equations using Z-transform.

Realization of IIR systems- directform-I, direct form –II, cascade form and parallel forms. Realisation of FIR systems-direct form, linear phase realization, cascade and parellel forms

UNIT- III

DFT AND FFT: Discrete Fourier Transform, magnitude and phase representation, Relationship of the DFT to other transforms, Properties of DFT, circular convolution, filtering long duration sequences, parameter selection to calculate DFT.

Computation of DFT using FFT algorithm – DIT & DIF - FFT using radix 2 – Butterfly structure- FFT applications.

UNIT IV

DESIGN OF DIGITAL FILTERS

FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics, frequency sampling method.

IIR design: Analog filter design - Butterworth and Chebyshev approximations; digital design using impulse invariant and bilinear transformation - Warping, prewarping - Frequency transformation.

UNIT- IV

FINITE WORD LENGTH EFFECTS:
Number representation, quantization, rounding truncation. Input quantization error, Product quantization error, Coefficient quantization error, Overflow limit cycle oscillations, Zero input limit cycle oscillations.
DIGITAL SIGNAL PROCSSORS: Overview and selection of DSPs, Architecture of TMS320C50, addressing modes, simple assembly language programmes

TEXT BOOKS

1. P. Ramesh Babu, "Digital Signal Processing", Fourth edition, Scitech publications, 2009

REFERENCE BOOKS

1. J.G Proakis and D.G.Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', Pearson Education, New Delhi, 2003 / PHI.
2. Alan V. Oppenheim, Ronald W. Schafer and John R. Buck, 'Discrete – Time Signal Processing', Pearson Education, New Delhi, 2003.
3 Johny R.Johnson :Introduction to Digital Signal Processing, Prentice Hall, 1984.

EI P61 PROCESS CONTROL LAB
(Common to ICE)

1. Modeling of single capacity level process from experimental Reactive curve. Obtain PID Tuning parameters from the model.
2. Modeling of Two capacity level process.
3. Modeling of two capacity interacting level process by semi log method.
4. Modeling of Thermal process from reaction curve and obtain tuning parameters from the model.
5. Modeling of Thermal process.
6. Closed loop control of flow process.
7. Closed loop control of level process.
8. Closed loop control of Thermal Process.
9. Closed loop control of Pressure process.
10. Inherent and Installed characteristic study of linear, equal percentage and quick opening valves.

EI P62 DSP AND MICROCONTROLLER EMBEDDED SYSTEMS LAB

1.Parallel Port Interfacing Using MCS51
2.Design of Real Time Clock using MCS 51 using segment Displays.
3.Design of PC interface Hardware with MCS51
4.Interfacing LCD Display using MCS51
5.Design of Single Channel Data Acquisition System Using MCS51.
6.PIC Microcontroller Design for DC Motor using PWM
7.Interrupts Programming using PIC and MCS51 (optional)
8.Implementation of Multiprocessor communication. (optional)
9. Study of various addressing modes of DSP using simple programming examples
10. Sampling of input signal and display
11. FFT computation
12. Power spectrum estimation
13. Design of FIR and IIR filters

EI P63 MODERN ELECTRONIC INSTRUMENTS LAB

1. Graphical Programming using LabVIEW
2. SCPI - Instrument interfacing using GPIB communication
3. RS232 communication for Instrument Interfacing.
4. Design of Programmable Digital Voltmeter Hardware
5. Design of Programmable Digital Function Generator Hardware
6. Design of Distributed Measurement using Ethernet by LabVIEW
7. Design of Digital Filters using LabVIEW
8. Design of Virtual Voltmeter and Function Generator
9. Design of Digital & Virtual Frequency meters.
10. Design of Programmable Motion Drives.

EI P64 GENERAL PROFICIENCY – II

UNIT – I :

COMPOSITION ANALYSIS: Technical and Non-Technical Passages (GRE Based) – Differences in American and British English – Analyzing Contemporary issues – Expanding Terminology

UNIT – II :

WRITING: Job Application Letter Writing – Resume Writing

UNIT – III :

ORAL SKILLS: Group Discussion – Introduction and Practice – Team Work – Negotiation Skills – Organizing and Attending Meetings – Facing Interviews

UNIT – IV :

ADAPTING TO CORPORATE LIFE: Corporate Etiquette – Grooming and Dressing

UNIT – V :

APTITUDE: Verbal and numerical aptitude

REFERENCES

1. Pushplata and Sanjay Kumar. Communicate or Collapse : A Handbook of Effective Public Speaking, Group Discussions and Interviews. Prentice-Hall, Delhi,2007.
2. Thorpe, Edgar. Course in Mental Ability and Quantitative Aptitude. Tata McGraw-Hill, 2003.
3. Thorpe, Edgar. Test Of Reasoning. Tata McGraw-Hill,2003.
4. Prasad,H.M. How to prepare for Group Discussion and Interview. Tata McGraw-Hill,2001.
5. Career Press Editors.101 Great Resumes. Jaico Publishing House,2003.
6. Aggarwal, R.S. A Modern Approach to Verbal & Non-Verbal Reasoning. S. Chand & Co.,2004.
7. Mishra Sunita and Muralikrishna, Communication Skills for Engineers, First Edition. Pearson Education, 2004.

EI T71 COMPUTER CONTROL OF PROCESS
(Common to ICE)

UNIT – I

ANALYSIS OF SAMPLED DATA CONTROL SYSTEM: Continuous and discrete systems sample data system- Z transform –inverse Z transform- selection of sampling period – mathematical representation of sampler- transfer function of zero order hold and first order hold device-Pulse transfer function – –open loop and closed response of linear sample data control system for step input – stability analysis: Jury's test and bilinear transformation-State space representation of sample data systems

UNIT – II

DIGITAL CONTROL ALGORITHMS – Deadbeat Algorithm – Dahlin's method – ringing – Kalman's approach – discrete equivalent to an analog Controller – design for load changes. PID Algorithms – tuning techniques. Selection of sampling time. Dead time Compensation – Smith Predictor Algorithm.

UNIT – III

SYSTEM MODELING AND IDENTIFICATION – Mathematical model for processes – first order. Second order processes without and with pure delay higher order systems – process modeling form step test data – pulse testing for process identification – time – domain identification – linear least square algorithm.

UNIT – IV

Robust Control, Intelligent Controllers, Optimal Control

UNIT –V

ADAPTIVE CONTROL: Introduction- types- MFA control- single loop MFA control-multivariable MFA control-model reference adaptive control.

MODEL PREDICTIVE CONTROL: Introduction- optimization problems- dynamic matrix control-DMC for first order process **–** quadratic DMC.

TEXT BOOK:

1. P.B. Deshpande and RH. Ash, "Elements of Computer Process Control", Instrument Society of America. 1981.

REFERENCES:

1. B.W.Bequette. "Process control" Prentice Hall Inc. 2006(unit IV)
2. C.L. Smith, "Digital Computer Process Control", Intext Educational Publishers, 1972.
3. Vance Vandoren" Techniques for Adaptive Control" BH publishers.,2003 (unit –V)

EI T72 ANALYTICAL INSTRUMENTATION
(Common to ICE)

UNIT I

ELECTROMAGNETIC RADIATION – different regions, their wavelengths, frequencies and energies - interaction of EM radiations with matter – atomic, molecular, electronic interaction - Basic principles of spectroscopy – emission and absorption of radiations – resonance - radiation sources – dispersing and resolving techniques – detectors - typical atomic emission and absorption spectrographs in the UV and visible region.

UNIT II

MOLECULAR SPECTRA – electronic, vibrational and rotational energies and spectra characteristic bands of radicals, OH, CH, CO, etc., - IR absorption - spectroscopy – single and double beam spectrophotometers - instrumentation techniques for analyzing solid, liquid and gaseous samples – sample handling techniques.

UNIT III

MICROWAVE SPECTROSCOPY – NMR, ESR and EPR spectroscopy – basic principles – instrumentation techniques and applications - principles of ion optics – ion sources – single focusing and double focusing mass spectrometers – principles and application

UNIT IV

Principles of X-ray fluorescence spectrometry and flame photometry – detection of X-rays and nuclear radiations – ionization chamber - proportional counter – GM counter - scintillation counter - solid state detector - gamma ray spectrometers – isotope dilution and tracer techniques for quantitative estimation and analysis.

UNIT V

ELECTROCHEMICAL METHODS – electrical conductivity of liquids conductivity and water purity – practical measurements and application – sulphur dioxide monitor – determination of pH – oxygen analyzers. Principles of gas and liquid chromatography – process chromatography – operation of typical process chromatography.

TEXT BOOKS

1. H.H. Willard, L.L. Merrit, J.A. Dean and F.A. Settle, Instrumental methods of Analysis, 6th edition - CBS Publishers and Distributers, 1986.
2. B.E.Noltingk (Edtr,) Jone's Instrument Technology, Vol. 2, Fourth Edition, Butterworths, 1986 (chapters 4 &5 for unit 5)

REFERENCE BOOKS

1. D.A. Skoog and D.M. West, Principles of Instrumental Analysis, 2 nd edition, Holt-Saunders, 1980.

EI T73 INDUSTRIAL SAFETY AND MANAGEMENT
(Common to ICE)

UNIT I

ENERGY CONVERSION – world fossil fuel reserves – world energy consumption – historical lives of fossil fuels – global energy and environmental management – environmental aspects of fossil, nuclear, hydro and biomass energy conversion – gaseous emissions – solid waste – liquid waste.

UNIT II

ENERGY MANAGEMENT – need for energy conservation – energy auditing – conducting real time continuous energy audits – data collection – automated data acquisition – data analysis – role of energy manager – energy audit instruments – gas analyzer – energy conservation in industries: boilers, pumps, fans, compressed air systems, refrigeration and air conditioning systems, DG sets, electrical motors, variable speed motors.

UNIT III

AIR POLLUTANTS AND GLOBAL CLIMATE – air pollutant effects. Pollution control laws and regulation – national and international – role of environmental monitoring in environmental management systems – continuous emissions monitoring systems. Pollution control – review of pollution control methods in thermal power plants – industrial – nuclear – automobiles – disposal/treatment of solid and liquid wastes – alternate fuels.

UNIT IV

SAFETY AND PRODUCTIVITY – causes of accidents in industries – accidents reporting and investigation – measuring safety performance – workman compensation rules.

UNIT V

SAFETY CODES AND STANDARDS – general safety considerations in power plants, pressure vessels and pressurized pipe lines – operation and inspection of extinguishers – preventing the spread of fire – emergency exit facilities.

TEXT BOOKS:

1. Blake Roland. P, “Industrial safety”, Prentice Hall of India, 1973.
2. Callaghan. P. O, “Energy Management”, McGraw Hill Book Co., 1993.

REFERENCES:

1. Culp. A. W, “Principles of Energy Conservation”, McGraw Hill Book Co., 1991.
2. Noel de Nervers, “Air Pollution Control Engineering”, McGraw Hill Book Co., 2000.

EI P71 COMPUTER CONTROL OF PROCESS LAB
(Common to ICE)

1. Programming a PLC to demonstrate control of a device using one push button, Generating square ware etc.
2. Programming a PLC to demonstrate an operation of Batch process.
3. Configuring and Implementation of programmable PID controllers.
4. Control of a process using dead beat algorithm using simulation.
5. Control of a process using Dhalings algorithm using simulation.
6. PC based control of flow process.
7. PC based control of level process.
8. PC based control of presence process.
9. PC based control of Thermal process.
10. Online Identification of process parameters from experimental data by least square estimate method.

EI P72 SEMINAR

Each one of the students will be assigned a Seminar Topic in the current and frontier areas. The student has to conduct a detailed study/survey on the assigned topic and prepare a report. The student will make an oral presentation followed by a brief question and answer session. The Seminar (presentation and report) will be evaluated by an internal assessment committee for a total of 100 marks.

EI P73 INDUSTRIAL VISITS /TRAINING

During the course of study from 3rd to 7th semester each student is expected to undertake a minimum of four industrial visits or undertake a minimum of two weeks of industry/field training. The students are expected to submit a report, which shall be evaluated by an internal assessment committee at the end of seventh semester for 100 marks.

EI PW7 PROJECT WORK (PHASE-I)

The objective of the project is to enable the students to work in groups of not more than four members in each group on a project involving analytical, experimental , design or combination of these in the area of Electronics and Instrumentation Engineering. Each project shall have a guide. The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. The evaluation is based on continuous internal assessment by an internal assessment committee for 100 marks.

EI T81 - ENGINEERING ECONOMICS

UNIT I

INTRODUCTION TO ECONOMICS:– Flow in an Economy, Law of supply and Demand, Concept of Engineering Economics – Engineering Efficiency, Economic Efficiency, Scope of Engineering Economics, Elements of costs, Marginal Cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-Even Analysis, P/V ratio, Elementary Economics Analysis – Material selection for product, Design selection for a product, Building material selection, Process Planning.

UNIT II

MAKE OR BUY DECISION, VALUE ENGINEERING : Function, Aims, Value Engineering procedure, Interest Formulas and their Applications – Time Value of Money, Single Payment Compound Amount Factor, Single Payment Present Worth Factor, Equal Payment Series, Compound Amount Factor, Equal Payment Series Sinking Fund Factor, Equal Payment Series Present Worth Factor, Equal Payment Series Capital Recovery Factor, Uniform Gradient Series Annual Equivalent Factor, Effective Interest Rate, Examples in all the methods.

UNIT III

METHODS OF COMPARISON OF ALTERNATIVES: Present Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Future Worth Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Annual Equivalent Method (Revenue Dominated Cash Flow Diagram, Cost Dominated Cash Flow Diagram), Rate of Return Method, Examples in all the methods

UNIT IV

REPLACEMENT AND MAINTENANCE ANALYSIS: Types of Maintenance, Types of Replacement Problem, Determination of Economic Life of an Asset, Replacement of an Asset with a New Asset – Capital Recovery with Return and Concept of Challenger and Defender, Simple Probabilistic Model for items which fail Completely.

UNIT V

DEPRECIATION: Introduction, Straight Line Method of Depreciation, Declining Balance Method of Depreciation, Sum-of-the-Years-Digits Method of Depreciation, Sinking Fund Method of Depreciation/Annuity Method of Depreciation, Service Output Method of Depreciation, Evaluation of Public Alternatives- Introduction, Examples, Inflation Adjusted Decisions – Procedure to Adjust Inflation, Examples on comparison of alternatives and Determination of Economics Life of asset.

TEXT BOOKS:

1. Panneerselvam. R., Engineering Economics, Prentice-Hall of India Pvt. Ltd., New Delhi, 2001.

REFERENCE BOOKS:

1. Degarmo E.P., Sullivan W.G. and Canada, J.R., Engineering Economy, Macmillan, New York, 1984.
2. Grant E.L., Ireson W.G. and Leavenworth R.S., Principles of Engineering Economy, Ronald Press, New York, 1976.
3. Smith G.W., Engineering Economics, Iowa State Press, Iowa, 1973.

EI T82 PLC AND DISTRIBUTED CONTROL SYSTEM

UNIT I

PLC Fundamentals – Discrete state vs continuous state control-Evolution of modern day PLCs building blocks of PLCs-Communication in PLCs.

UNIT II

PLC Applications-Programming methods- Relay & logic ladder diagrams-Boolean logic-High level languages-Graphical representation- programming examples - Comparative study of industrial PLCs.

UNIT III

Elements of DCS –Evolution of DCS - Building blocks- Detailed descriptions and functions of field control units-Operator stations and data highways-Redundancy concepts.

UNIT IV

Case studies in DCS-Comparative study of industrial DCS-Reliability calculations - intrinsically safe instrumentation –Case studies

UNIT V

Communications in DCS - Basics of Computer networks - Special requirements of network used for control - Communication protocols-link access mechanism-Manufactures automation protocols - Field bus and Smart transmitters.

TEXT BOOKS:

1. Lukcas M.P., Distributed control systems, Van Nostrand Reinhold co., Newyork,1986.
2. Huges T, Programmable Logic Controllers, ISA press,1994.

REFERENCE BOOKS

1. Moore, Digital control devices, ISA press, 1986.
2. Tanaenbaum A.S., Computer networks, Prentice Hall, 1998.

EI T83 VLSI DESIGN

Unit - I

Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS technologies- Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design-Gate realization using CMOS-Introduction to Reconfigurable Hardware – HDL basics.

Unit – II

VHDL basics - VHDL levels of abstraction - Abstraction and timing - The VHDL design flow - VHDL design entities - Entity declarations - Architectures - Using libraries and packages - Concurrent signal assignments - Signal assignments with delays.

Unit - III

Component declarations - Component instantiation - Named port mapping - Positional port mapping - Direct instantiation - Configuration specifications - Entity binding
Port modes - VHDL processes - Processes sensitivity lists - Objects in VHDL - Constants, variables and signals - VHDL types - Scalar types - Arrays – Records - Custom types and subtypes

Unit - IV

Concurrent statements - Sequential statements - Conditional & selective signal assignments - The generate statement - Signal and variable assignments -
For loops - Subprograms – Functions – Procedures - Differences between functions and procedures - Subprogram declarations – Packages - Package declaration - Package body.

Unit – V

VHDL synthesis - Modeling hardware in VHDL - VHDL models for multiplexers, Encoders, Decoders, Parity Generators – combinational circuit implementation - compilation and simulation of VHDL code, modeling a sequential machine, Test bench development.

TEXT BOOK :
VHDL Primer by J. Bhasker, Prentice Hall. 2006

REFERENCES:

1. Chip Design for Submicron VLSI: CMOS Layout & Simulation, - John P. Uyemura, Thomson Learning.
2. Introduction to VLSI Circuits and Systems - John .P. Uyemura, JohnWiley, 2003.
3. Digital Integrated Circuits - John M. Rabaey, PHI, EEE, 1997.
4. Modern VLSI Design - Wayne Wolf, Pearson Education, 3rd Edition, 1997.

EI P81 INDUSTRIAL AUTOMATION LAB

(Any five experiments has to be done from each part)

Part - A

1. Calibration of Pressure gauge using Dead weight Tester.
2. Calibration of manometers
3. Calibration of Control valves
4. Calibration of I to P and P to I converters
5. Calibration of Pressure Switch.
6. Calibration of RTD and Thermocouple.

Part - B

1. Study of basic programming of PLC
2. Analog operation in PLC
3. Arithmetic operation, Timer, Counter operation using PLC
4. Annunciator design using PLC
5. Application using PLC PC based programming (Level control, Temperature control, Speed Control)
6. Study and Demonstration of DCS
7. Developing control logic using DCS
8. Application of DCS(Level control, Pressure control)
9. Application of DCS(Boiler Control, Distillation column control)
10. Virtual DCS

EI P82 PROFESSIONAL ETHICS PRACTICE

The course should cover the following topics by way of Seminars, Expert Lectures and Assignments:

1. Engineering Ethics – Moral issues, Ethical theories and their uses
2. Engineering as Experimentation – Code of Ethics
3. Engineer's responsibility for safety
4. Responsibilities and rights
5. Global issues of engineering ethics

REFERENCE BOOK

1. Charles D.Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999

EI P83 COMPREHENSIVE VIVA-VOCE

The student will be tested for his understanding of basic principles of the core Electronics and Instrumentation Engineering subjects. The internal assessment for a total of 50 marks will be made by an internal assessment committee. The committee will conduct two written examinations of objective or short questions type from the all the core subjects. The external university examination, which carries a total of 50 marks, will be a Viva Voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.

EI PW8 PROJECT WORK (PHASE II)

Project work phase II will be an extension of the project work started in the seventh semester. On completion of the work, a project report should be prepared and submitted to the department. The project work and the report will be evaluated by an internal assessment committee for 50 marks. The external university examination, which carries a total of 50 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.

ELECTIVES – 6TH SEMESTER
EI E61 INDUSTRIAL ELECTRONICS

UNIT I.

REGULATED SUPPLIES AND SCR: Switched Mode voltage regulator, Comparison of Linear and Switched Mode Voltage Regulators, Servo Voltage Stabilizer, monolithic voltage regulators Fixed and Adjustable IC Voltage regulators, 3-terminal Voltage regulators, Current boosting .Principles of operation and characteristics of SCR, Triggering of Thyristors, Commutation Techniques of Thyristors, Classes A, B, C, D, E and F, Ratings of SCR.

UNIT II

APPLICATIONS OF SCR-I: Static circuit breaker, Protection of SCR, Inverters, Classification, Single Phase inverters, Converters , single phase Half wave and Full wave.Chopper circuits, Principle, methods and Configurations, Diac and Triac, Triacs, Triggering modes, Firing Circuits, Commutation

UNIT-III

APPLICATIONS OF SCR-II Voltage compensator – solid state DC voltage regulation – DC shunt motor – armature control and field control of motor speed – electronic control of DC motor – speed regulator action – full wave motor speed regulation by one SCR

UNIT-IV

INDUSTRIAL TIMERS : Industrial timers -Classification, types, Electronic Timers, Classification, RC and Digital timers, Time base Generators. Electric Welding , Classification, types and methods of Resistance and ARC wielding

UNIT –V

INDUSTRIAL HEATING APPLICATIONS : High Frequency heating, principle, merits, applications, High frequency Source for Induction heating. Dielectric Heating, principle, material properties, Electrodes and their Coupling to RF generator, Thermal losses and Applications.Ultrasonics, Generation and Applications.

TEXTBOOKS

1. Industrial and Power Electronics, G.K. Mithal and Maneesha Gupta, Khanna Publishers, 19th Ed., 2003.

REFERENCES

1. Thyristors and applications, M. Rammurthy, East-West Press, 1977.
2. Industrial electronics and control, S.K. Bhattacharya and S.chatterjee, Tata Me Graw Hill, 1995
3. Frank D. Petruzella, Industrial Electronics, McGraw Hill International Editions, 1996

EI E62 TELEMETRY AND TELECONTROL

UNIT – I

TELEMETRY FUNDAMENTALS AND CLASSIFICATION: Fundamental concepts – Significance, Principle, functional blocks of Telemetry and Telecontrol system-Methods of telemetry –
Electrical, Pneumatic, Hydraulic and Optical Telemetry – State of the art-Telemetry standards.

UNIT – II

LANDLINE TELEMETRY: Electrical Telemetry-Current Systems – Voltage Systems –
Synchro Systems – Frequency systems – Position and Pulse systems – Example of a landline telemetry system.

UNIT – III

RADIO TELEMETRY: Block diagram of a Radio Telemetry system – Transmitting and
receiving techniques – AM, FM, PM, Multiplexing and demultiplexing – Transmitting and receiving techniques – Digital coding methods – Advantages of PCM, PWM, PM, FSK – Delta modulation – coding and decoding equipment – Example of a radio telemetry system.

UNIT – IV

OPTICAL TELEMETRY: Optical fibers for signal transmission – Sources for fiber optic transmission – Optical detectors – trends in fiber – optic device development – Example
of an optical telemetry system.

UNIT – V

TELECONTROL METHODS: Analog and Digital techniques in telecontrol, telecontrol
apparatus – Remote adjustment, Guidance and regulation – Telecontrol using information theory – Example of a telecontrol system.

REFERENCES:

1. Gruenberg. L “Handbook of telemetry and remote control”,McGraw Hill, New York, 1987.
2. Swobodoa. G., “Telecontrol methods and applications of Telemetry and Remote Control”, Reinhold Publishing Corp., London, 1988.
3. Young R.E., “Telemetry Engineering”, Little Books Ltd, London 1988.
4. Housley T, “Data communication and teleprocessing system”, Prenctice Hall International, Englewood Cliffs, New Jersey, 1987.

EI E63 VISUAL PROGRAMMING FOR INSTRUMENTATION ENGINEERS

UNIT I WINDOWS PROGRAMMING

Windows environment – a simple windows program – windows and messages – creating the window – displaying the window – message loop – the window procedure – message processing – text output – painting and repainting – introduction to GDI – device context – basic drawing – child window controls

UNIT II VISUAL C++ PROGRAMMING – INTRODUCTION

Application Framework – MFC library – Visual C++ Components – Event Handling – Mapping modes – colors – fonts – modal and modeless dialog – windows common controls – bitmaps

UNIT III THE DOCUMENT AND VIEW ARCHITECTURE

Menus – Keyboard accelerators – rich edit control – toolbars – status bars – reusable frame window base class – separating document from its view – reading and writing SDI and MDI documents – splitter window and multiple views – creating DLLs – dialog based applications

UNIT IVACTIVEX AND OBJECT LINKING AND EMBEDDING (OLE) ActiveX controls Vs. Ordinary Windows Controls – Installing ActiveX controls – Calendar Control – ActiveX control container programming – create ActiveX control at runtime – Component Object Model (COM) – containment and aggregation Vs. inheritance – OLE drag and drop – OLE embedded component and containers – sample applications

UNIT V ADVANCED CONCEPTS

Database Management with Microsoft ODBC – Structured Query Language – MFC ODBC classes – sample database applications – filter and sort strings – DAO concepts – displaying database records in scrolling view – Threading – VC++ Networking issues – Winsock – WinInet – building a web client – Internet Information Server – ISAPI server extension – chat application – playing and multimedia (sound and video) files

TEXT BOOKS

1.Charles Petzold, “Windows Programming”, Microsoft press, 1996 (Unit I – Chapter 1-9)
2.David J.Kruglinski, George Shepherd and Scot Wingo, “Programming Visual C++”, Microsoft press, 1999 (Unit II – V)

REFERENCE

1.Steve Holtzner, “Visual C++ 6 Programming”, Wiley Dreamtech India Pvt. Ltd., 2003.

EI E64 OBJECT-ORIENTED TEST AND MEASUREMENT SOFTWARE DEVELOPMENT

UNIT I

PROGRAMMING TEST SYSTEMS: Test Systems - Components of a Test System - Software for Test Systems. Programming a Test System – OOP Paradigm - Data abstraction – encapsulation – class – inheritance – polymorphism – reusability

UNIT II

OBJECT ORIENTED PROGRAMMING AND DESIGN: Object Oriented Programming in C++ - Classes – objects – dynamic memory allocation – constructor – destructor – friend functions – operator overloading – templates – Object Oriented Design.

UNIT III

INHERITANCE AND POLYMORPHISM: Derived class and base class – derived class constructor – modes of inheritance – multiple inheritance – virtual function – polymorphism – dynamic binding – abstract class.

UNIT IV

OBJECT ORIENTED TEST & MEASUREMENT SYSTEMS: High level OO Design of a T&M System - Building and Instrument I/O Class Instrument Classes - Measurement and Test Classes - Building an Object Oriented T&M System.

UNIT V

CASE STUDY : Creating OO Data Types - Error Handling - Advanced Instrument Classes – object oriented Test and Measurement software Applicable to Programmable Instruments - Case study.

TEXT BOOKS

1.Lee Atchison Object-oriented Test and Measurement Software Development in C++, Prentice Hall PTR (July 22, 1996)

REFERENCES

1. Herbert Schildt, "C++ The complete reference", TMH, 1997.
2. Stanley B. Lippman, Jore Lajoie, "C++ Primer", III edition, Addison Wesley, 2000.
3.Barkakati N, "Object Oriented Programming in C++", PHI, 1995.
4.Kris Jamsa, "Java programming – A Complete reference", Galgotia Publication, 1994.
5.Patrick Naughton, Herbert Schildt, "Java The complete reference", TMH, 1997.

6.Bjarne Stroustrup, "The C++ Programming Language", Addison Wesley, 2000.
7. Ken Arnold, James Gosling, "The JAVA language", II edition, Addison Wesley, 1998.
8.E.Balaguruswamy, "Object Oriented Programming with C++", II edition, TMH, 2001.

EI E65 BIOMEDICAL INSTRUMENTATION

UNIT – I

ELECTRO PHYSIOLOGY: Review of Physiology and anatomy – sources of Bioelectric Potentials – Resting and Action Potentials – Propagation of Action Potentials –Electrodes theory – Bio potential electrodes – Bio chemical transducers – Transducers forBio Medical applications.

UNIT – II

BIOMEDICAL RECORDERS AND CARDIOVASCULAR MEASUREMENT: Physiology of cardiovascular and nervous system – ECE-EEE-EME – Foetal ECE-Phonocardiography – Vector Cardiography – Holtel monitoring – BP – Blood flow – cardiac output – ICCU – Bedside unit and central monitoring unit.

UNIT – III

PULMONARY MEASUREMENT AND BIO TELEMETRY: Physiology of respiratory system –Respiratory rate measurement – wine and wireless Biotelemetry – Telemetering multiple information – implanted transmitters – sauces of electrical hazards and safety techniques.

UNIT – IV

MEDICAL IMAGING SYSTEM: Ultrasound scanner – Echo cardiography – Coloar Doppler system – CAT and CT scan – MRI Imaging – Cine angiogram – LASER Imaging –Endoscope.

UNIT – V

THERAPEUTIC UNITS: Physiotheraphy and Electrotheraphy - Short ware, Microwave diathermy –Defibrillators – Cardio vector – Hearing aid – dialysis machine.

TEXT BOOKS:

1. Leshie Cromwell, Fred. J. Weibell and Erich. A. Pfeiffer, “Biomedical Instrumentation and Measurements”, 2nd Edition, PHI, 2003.
2. R.Anandanatarajan, “Biomedical Instrumentaion”, PHI Learning, 2009.

REFERENCES:

1. R.S. Khandpar, “Hand Book of Biomedical Instrumentation and measurement”, McGraw Hill publishing Co., 1990.
2. Aston, “Principles of Biomedical Instrumentation and measurements”, McGraw Hill publishing Co., 1990.
3. M. Arumugam, “Biomedical Instrumentation”, Anuradha Agencies Publishers, Vidayal Karuppar, 612 606, Kumbakonam, R.M.S: 1992.

ELECTIVES – 7TH SEMESTER

EI E71 OPERATING SYSTEMS

UNIT I

COMPUTER SYSTEM AND OPERATING SYSTEM OVERVIEW: Overview of computer operating systems operating systems functions protection and security distributed systems special purpose systems operating systems structures and systems calls operating systems generation

PROCESS MANAGEMENT – Process concepts threads, scheduling-criteria algorithms, their evaluation,

Thread scheduling, case studies UNIX, Linux, Windows

UNIT II

CONCURRENCY : Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples, atomic transactions. Case studies UNIX, Linux, Windows

MEMORY MANAGEMENT : Swapping, contiguous memory allocation, paging, structure of the page table , segmentation, virtual memory, demand paging, page-Replacement, algorithms, case studies UNIX, Linux, Windows

UNIT III :

PRINCIPLES OF DEADLOCK – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock,

I/O systems, Hardware, application interface, kernel I/O subsystem, Transforming I/O requests Hardware operation, STREAMS, performance.

UNIT IV :

FILE SYSTEM INTERFACE- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

FILE SYSTEM IMPLEMENTATION- File system structure, file system implementation, directory implementation, directory implementation, allocation methods, free-space management, efficiency and performance, case studies. UNIX, Linux, Windows

MASS-STORAGE STRUCTURE overview of Mass-storage structure, Disk structure, disk attachment disk scheduling, swap-space management, RAID structure, stable-storage implementation, Tertiary storage structure.

UNIT V:

PROTECTION : Protection, Goals of Protection, Principles of Protection, Domain of protection Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection,

SECURITY- The Security problem, program threats, system and network threats cryptography as a security tool, user authentication, implementing security defenses, firewalling to protect systems and networks, computer –security classifications, case studies UNIX, Linux, Windows

TEXT BOOKS :

1. Abraham Silberchatz, Peter B. Galvin Operating System Concepts-, Greg Gagne 7th Edition, John Wiley.
2. D. M.Dhamdhere , Operating systems- A Concept based Approach, 2nd Edition, TMH

REFERENCES :

1. Stallings, 'Operating Systems' – Internal and Design Principles, Fifth Edition–2005, Pearson education/PHI
2. Crowley, Operating System A Design Approach, TMH.
3. Andrew S Tanenbaum, Modern Operating Systems, 2nd edition Pearson/PHI.

EI E72 OPTIMIZATION TECHNIQUES

UNIT I

MATHEMATICAL PRELIMINARIES: Vector Spaces, Vector Space Operations, Data Fitting, Eigenvalues and Eigenvectors Convergence in R^n, Calculus on R and R^n,Calculus for a Function of One Variable Calculus for a Function of Several Variables, Convex Analysis, Convex sets, Convex Functions

UNIT II

ONE-DIMENSIONAL OPTIMIZATION: Function Comparison Methods, Polynomial Interpolation Methods \Iterative Methods, Function Comparison Methods, Two Point Equal Interval Search Method of Bisection, Fibonacci Method, Golden Section Search, Polynomial Interpolation, Quadratic Interpolation, Cubic Interpolation; Iterative Methods, Newton's Method, Secant Method, Case studies

UNIT III

UNCONSTRAINED GRADIENT BASED OPTIMIZATION METHODS
Gradient and Conjugate Gradient Type Algorithms, Method of Steepest DescentConjugate Gradient Method (Method of Fletcher and Reeves), Newton Type Methods Newton's Method, Marquardt's Method, Quasi-Newton Algorithms, Case studies

UNIT IV

LINEAR PROGRAMMING
Simplex Method, Movement from One Extreme Point to another Algorithm, Revised Simplex Method, Finding Initial Solution, Two Phase Simplex Method, Duality Duality Theory, Dual Simplex Method, Case studies

UNIT V

CONSTRAINED OPTIMIZATION METHODS AND EVOLUTIONARY ALGORITHMS
Lagrange Multipliers, Kuhn-Tucker Conditions, Convex optimization, Transformation Methods, Penalty Function Techniques, Method of Multipliers Linearization Methods, Linearly Constrained Problems, Cutting Plane Method Direction Generation Methods, The Method of Feasible Directions, The Generalized Reduced Gradient Method, case studies

EVOLUTIONARY ALGORITHMS: Box Complex Method, Box Complex Method, Genetic Algorithm, Case studies

TEXT BOOK

Mohan C Joshi, Kannan M Moudgalya "Optimization: Theory and practice" Narosa publishing House

REFERENCE BOOK

S. S.Rao, "Engineering optimization: Theory and practice"-New Age International (P) Limited, 3rd edition, 1998.

EI E73 INSTRUMENTATION AND CONTROL IN PETROCHEMICAL INDUSTRIES

UNIT – I

Petroleum Exploration – Petroleum recovery techniques –oil-gas separation-Processing of wet gases – refining of crude oil.

UNIT – II

Unit operations in petroleum industry – Thermal cracking – Catalytic cracking – Catalytic reforming – Polymerization – Alkylation – Isomerization – production of ethylene acetylene and propylene from petroleum.

UNIT – III

Chemicals from petroleum – Methane derivatives – Acetylene derivatives – ethylene derivatives – Propylene derivatives – other products.

UNIT – IV

Measurements in refineries and petrochemical industries – selection and maintenance of measuring instruments – special measurement problems.

UNIT – V

Process control in refineries and petrochemical industries – Control of distillation column – control of Catalytic crackers and pyrolysis unit – Automatic control of polyethylene production – Control of Vinyl chloride and PVC production.

REFERENCES:

1. Waddams A.L, “Chemicals from Petroleum”,Butter and Tanner Ltd., 1968.
2. Balcen J.G. and Mumme K.I., “Process Control Structures and Applications”, New York. 1968.
3. Austin G.T. Shreves, “Chemical Process industries”, McGraw Hill international student edition Singapore. 1985.

EI E74 POWER PLANT INSTRUMENTATION

UNIT I

INTRODUCTION : Piping and instrumentation diagram of a thermal power plant, basic process on a boiler, Fuel measurement- review of pressure and temperature measurement steam and water flow measurement – instrument applications in power stations: review of indicating and recording instrument applications in power stations: review of indicating and recording instruments, water level gauge for boiler drums, closed circuit television instrument, gas analysis meters, smoke instruments, dust monitor-measurement of impurities in feed water and steam generator coolant controls and instruments-instrument maintenance aspects.

UNIT II

BOILER CONTROL-I: Boiler control objectives-combustion of fuels (gaseous liquid, and solid), excess air, combustion chemistry and products of combustion, requirement for excess combustion, air-circulation of efficiency of boiler: input/output method-stream temperature control systems super heaters and de-superheaters.

UNIT III

BOILER CONTROL-II: Feed water supply and boiler water circulation system-drum level control systems-boiler draft systems-measurement and control of furnace draft-measurement and control of combustion-draft and air flow control related functions.

UNIT IV

FLUE GAS ANALYSIS TRIMMING OF COMBUSTION CONTROL SYSTEMS : Combustion control for liquid and gaseous fuel boilers coal or solid fuel strokes-combustion control for stoker-fired boilers- pulverised coal-fired boilers. Turbine monitoring and control: speed, vibration, shell temperature monitoring.

UNIT V

NUCLEAR POWER PLANT INSTRUMENTATION: Piping and instrumentation diagram of different types of nuclear power plants-radiation detection instruments-process sensors for nuclear power plants-spectrum analyzers-nuclear reactor control systems and allied instrumentation.

TEXT BOOK:

1. B.G.Liptak, Instrumentation in process industries, Vol. I and II, Chilton books co, 1973.
2. Sam G. Dukelow. The control of boilers, Instrument Society of America press.

REFERENCE BOOKS:

1. A.Sherryet. Al. (Editors), Modern power station practice, Vol.6 (Instrumentation controls and testing), Pergamon Press, 1971.

EI E75 INSTRUMENTATION BUSES AND DATA NETWORKS

UNIT - I

Basic concepts on Busses , Interrupts , Interfacing PC systems – Interfacing Standards – comparison of different busses – PCI Bus – PCI operation , Bus arbitration – PCI pins – configuring address space – I/O addressing – ISA Bus – ISA operation – ISA pins – address space configuration.

UNIT - II

Motherboard Design – Introduction – TX mother board. IDE and Mass storage – Tracks and sectors – Floppy discs – drive specification – hard disc and CD ROM specifications – IDE interface – communication - SCSI- types, interface, operation, pointers- Message system description – SCSI commands.

UNIT - III

PCMCIA – Introduction, PCMCIA signals and registers. Introduction to USB and FIREWIRE ports – AGP – PCI and AGP, Bus transactions, Pin Description, AGP master configuration, Bus commands – Addressing modes and Bus commands – Register Description. Fiber channel – Introduction, channel Standards, cables hubs, adapters and connectors. RS -232 – Electrical characteristics – communication between two nodes-programming RS-232. Introduction to RS-422, RS-423,and RS-485.Line Drivers – RS232/485 converter.

UNIT - IV

Parallel Port-Introduction, PC connections, data handshaking, I/O addressing, Interrupt driven parallel port. Enhanced Parallel port- Introduction compatibility mode, Nibble mode, Byte mode-EPP, ECP.MODBUS- MODBUS protocol, Function codes, diagnostics. FIELDBUS-Types, Foundation FIELDBUS.WORLDFIP-Introduction, physical layer, data link layer. CAN BUS-introduction, Bus basics, Message transfer, Fault confinement, Bit timing, CAN open.

UNIT - V

IEEE 488,VME and VXI- Instruction, IEEE 488 bus, VME bus , VXI bus. TCP/IP – Introduction, Gateways and hosts, IP protocol, Internet diagram, TCP/IP internets, Domain naming system. Networks – Introduction- topologies, OSI model, Routers, Bridges and repeaters – Network cable types.

REFERENCES:

Computer Busses – William Buchanan – CRC press
IBM PC and CLONES – B.Govindarajalu – Tata McGraw – Hill Publishing Company.

EI E76 WEB BASED INSTRUMENTATION

UNIT - I
BASIC INTERNET CONCEPTS

History of Internet – RFCs, FYIs and STDs – Security – Protocols – Internet addressing – DNS and directory services. Applications of Internet in the field of Internet and Control – Distributed Measurements.

UNIT -II
.INTERNET APPLICATION

Electronics Mail, Newsgroups, UUCP, FTP, Telnet, Finger . Data Acquisition using internet – online monitoring and control.

UNIT –III
WORLD WIDE WEB 8

Overview – Hypertext Mark-up language – Uniform resources locators – HTTP protocol – Common gateway interface – Multipurpose internet mail extensions – Web browsers such as Netscape, Internet Explorer.

UNIT – IV
JAVA PROGRAMMING LANGUAGE 13

History – Language features – Classes, object and methods – Sub classing dynamic binding – Packages – Exceptions – Multithreading – JVM and security – Over view of class library: I/O, AWT and NET – JDBC, Object serialisation – remote method invocation – Java script – Java vs C++.

UNIT – V
MISCELLANEOUS TOPICS 9

Intranets – Internet commerce – Internet and VRML – Active X. Case study : Internet based measurement , Telemonitoring and Tele control in Biomedical , instrumentation Applications.

TEXT BOOKS

1. April Marine, Susan Kirkpatrick, Vivian Neou and Carol Ward, ‘Internet: Getting started’, PTR Prentice Hall, 1994.
2. Ed Krol, ‘The whole Internet: User’s guide and catalogue’, O’Reilly & Associates Inc., 1992.
3. William E. Weinman, ‘The CGT book’, New Riders, 1996.

REFERENCE BOOKS

1. Deitel and Deitel, 'Java: How to Program', Prentice Hall, 1997.
2. Gary Cornell and Cay S. Horstmann, 'Core Java (second edition)', Sunsoft Press, 1997.
3. Ted Coombs, Jason Coombs and Don Brewer, 'Active X Source book', John Wiley & sons, 1996.
4. Douglas E. Corner, 'Computer Networks and Internet', Prentice Hall, 1999.
5. Mark Austin, David Chancogne, "Introduction to Engineering Programming in C and Java", John Wiley & Sons, 1999.
6. Raymond Greenlaw, "Fundamentals of the internet and the world wide web", Tata McGraw-Hill, ND, 1999

EI E77 DATABASE MANAGEMENT SYSTEMS

UNIT I

INTRODUCTION AND CONCEPTUAL MODELING: Introduction to File and Database systems- Database system structure – Data Models – Introduction to Network and Hierarchical Models – ER model – Relational Model – Relational Algebra and Calculus.

UNIT II

RELATIONAL MODEL: SQL – Data definition- Queries in SQL- Updates- Views – Integrity and Security – Relational Database design – Functional dependences and Normalization for Relational Databases (up to BCNF).

UNIT III

DATA STORAGE AND QUERY PROCESSING : Record storage and Primary file organization- Secondary storage Devices- Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for files –Different types of Indexes- B-Tree - B+Tree – Query Processing.

UNIT IV

TRANSACTION MANAGEMENT: Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control – Recovery Techniques – Concepts- Immediate Update- Deferred Update - Shadow Paging.

UNIT V

CURRENT TRENDS Object Oriented Databases – Need for Complex Data types- OO data Model- Nested relations- Complex Types- Inheritance Reference Types - Distributed databases- Homogenous and Heterogenous- Distributed data Storage – XML – Structure of XML- Data- XML Document- Schema- Querying and Transformation. – Data Mining and Data Warehousing.

TEXT BOOKS

1.Abraham Silberschatz, Henry F. Korth and S. Sudarshan- “Database System Concepts”, Fourth Edition, McGraw-Hill, 2002.

REFERENCES

1. Ramez Elmasri and Shamkant B. Navathe, “Fundamental Database Systems”, Third Edition, Pearson Education, 2003.
2. Raghu Ramakrishnan, “Database Management System”, Tata McGraw-Hill Publishing Company, 2003.
3. Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- “Database System Implementation”- Pearson Education- 2000.
4. Peter Rob and Corlos Coronel- “Database System, Design, Implementation and Management”, Thompson Learning Course Technology- Fifth edition, 2003.

EI E78 FIBRE OPTICS AND LASER INSTRUMENTATION

UNIT - I

. OPTICAL FIBRES AND THEIR PROPERTIES Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion – Connectors & splicers – Fibre termination – Optical sources – Optical detectors.

UNIT - II

. INDUSTRIAL APPLICATION OF OPTICAL FIBRES Fibre optic sensors–Fibre optic instrumentation system – Different types of modulators – Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

UNIT - III

LASER FUNDAMENTALS Fundamental characteristics of lasers – Three level and four level lasers – Properties of laser – Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers – Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

UNIT - IV

. INDUSTRIAL APPLICATION OF LASERS Laser for measurement of distance, length, velocity, acceleration, current, voltage and atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

UNIT – V

HOLOGRAM AND MEDICAL APPLICATIONS

Holography – Basic principle - Methods – Holographic interferometry and application, Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser and tissue interactive – Laser instruments for surgery, removal of tumours of vocal cards, brain surgery, plastic surgery, gynaecology and oncology.

TEXT BOOKS

1. J.M. Senior, ‘Optical Fibre Communication – Principles and Practice’, Prentice Hall of India, 1985.
2. J. Wilson and J.F.B. Hawkes, ‘Introduction to Opto Electronics’, Prentice Hall of India, 2001.

REFERENCE BOOKS

1. Donald J.Sterling Jr, 'Technicians Guide to Fibre Optics', 3rd Edition, Vikas Publishing House, 2000.
2. M. Arumugam, 'Optical Fibre Communication and Sensors', Anuradha Agencies, 2002.
3. John F. Read, 'Industrial Applications of Lasers', Academic Press, 1978.
4. Monte Ross, 'Laser Applications', McGraw Hill, 1968
5. G. Keiser, 'Optical Fibre Communication', McGraw Hill, 1995.
6. Mr. Gupta, 'Fiber Optics Communication', Prentice Hall of India, 2004.

ELECTIVES – 8TH SEMESTER

EI E81 ROBOTICS AND AUTOMATION

UNIT – I

INTRODUCTION : Robotics – Basic components – Classification – Performance characteristics – Actuators- Electric actuator- DC motor horse power calculation, magnetostrictive hydraulic and pneumatic actuators. Sensors and vision systems: Different types of robot transducers and sensors – Tactile sensors – Proximity and range sensors –ultrasonic sensor-touch sensors-slip sensors-sensor calibration- vision systems – Image processing and analysis – image data reduction – segmentation feature extraction – Object recognition.

UNIT – II

ROBOT CONTROL : Control of robot manipulators- state equations-constatnt solutions-linear feedback systems-single axis PID control- PD gravity control- computed torque control- variable structure control- Impedance control .

UNIT – III

END EFFECTORS : End effectors and tools– types – Mechanical grippers – Vacuum cups – Magnetic grippers – Robot end effectors interface, work space analysis work envelope-workspace fixtures-pick and place operation- continous path motion-interpolated motion-straight line motion.

UNIT – IV

ROBOT MOTION ANALYSIS : Robot motion analysis and control: Manipulator kinematics –forward and inverse kinematics- arm equation-link coordinates-Homogeneous transformations and rotations and Robot dynamics .

UNIT – V

ROBOT APPLICATIONS : Industrial and Non industrial robots, Robots for welding, painting and assembly – Remote Controlled robots – Robots for nuclear, thermal and chemical plants – Industrial automation – Typical examples of automated industries.

TEXT BOOKS:

1. Mikel P. Grover , et. Al. “Industrial Robots – Technology Programming and Applications”, McGraw Hill, 1980.
2. Robert J.Schilling, Fundamentals of Robotics-Analysis and Control, PHI,2007. (Unit-II and Unit-III)

REFERENCE:

1. K.S.Fu,R.C.Gonzalez, CSG. Lee, Robotics,control sensing vision and Intelligence, Tata Mcgraw-Hill, 2008

EI E82 DESIGN OF PROCESS CONTROL SYSTEM COMPONENTS

UNIT – I

ORIFICE METER – design of orifice for given flow condition – design of rotameter – design of RTD measuring circuit – design of cold junction compensation circuit for thermocouple using RTD – Transmitters – Zero and span adjustment in D/P transmitters and temperature transmitters.

UNIT – II

BOURDON GAUGES – factors affecting sensitivity – design of Bourdon tube – Design of Air purge system for level measurement. Electronic P+I+D controllers – design – adjustment of setpoint, bias and controller settings.

UNIT – III

CONTROL VALVES – design of actuators and positioners – types for valve bodies – valve characteristics – materials for body, and trim – sizing of control valves – selection of body, materials and characteristics of control valves for typical applications.

UNIT – IV

TYPES OF PUMPS – pump – performance – pipe work calculation – characteristics of different pumps – pump operation maintenance – instruments used in pumping practice pump noise and vibration – selection of pumps.

UNIT - V

Design of logic circuits for alarm and annunciator circuits, interlocks – design of microprocessor based P+I+D controller.

TEXT BOOKS:

1. N.A. Anderson, “Instrumentation for Process Measurement and Control”, Chillton Company, 1980.
2. D.M. Considine, “Process Instruments and Controls Handbook”, McGraw Hill Book Co. 1985.

REFERENCES:

1. R.H. Warring, “Pumping Manual”, Gulf Publishing Co., 1984.
2. C.D. Johnson, “Process Control Instrumentation Technology”, Prentice Hall Inc. 1988.

EI E83 FUZZY LOGIC AND NEURAL NETWORKS

UNIT – I

MOTIVATION FOR THE DEVELOPMENT OF NEURAL NETWORKS – artificial Neural networks –biological neural networks – Typical architecture – Training common Activation functions. McCulloh Pitts neuron: Architecture, algorithm and applications – Back propagation neural net – standard architecture – Algorithm – derivation of learning rules – number of hidden layers – Hopfield net architecture algorithm and applications Adaptive Resonance Theory: Architecture and operation.

UNIT – II

NEURAL NETWORKS BASED ON COMPETITION: Kohinoor's Self Organizing map- Counter propagation Networks – Neural networks for control: Schemes of neuro control – Inverse dynamics. Case study: Neuro controller for a temperature process and Inverted Pendulum problem.

UNIT – III

INTRODUCTION TO FUZZY LOGIC: Fuzzy sets – properties of fuzzy sets – operations on fuzzy sets. Fuzzy relations linguistic variables – linguistic approximation. Fuzzy statements:Assignments, Conditional and unconditional statements fuzzy rule base – fuzzy algorithm.

UNIT – IV

FUZZY LOGIC CONTROL SYSTEM: Fuzzy logic controller – Fuzzification, Membership functions. Triangular, Trapezoidal, Grassian – Membership value assignments using neural networks, intention, inference – knowledge base – Inference Mechanism –Defuzzification case study: Fuzzy logic controller for a temperature process – inverted pendulum control problem.

UNIT – V

NEUROFUZZY LOGIC CONTROL: Adaptive fuzzy controller – self timing and self organizing controllers – stability of FLC – Non linear Fuzzy control – Fuzzy neuron.

TEXT BOOKS:

1. SLaurence fausett, "Fundamentals of neural networks", Prentice Hall, New Jersey 1994.
2. Jacek. M. Zurada "Introduction to Artificial Neural Systems", Jaico Publishing House, 1999.

REFERENCES:

1. Timothy. J. Ross, "Fuzzy logic with Engineering Application", McGraw Hill, New york,1996.
2. Klir G. J. and fogler T.A, " Fuzzy sets, Uncertainty and Information", Prentice Hall of India, New Delhi, 1994.
3. James. A. Freeman David. M.S. Kapura, "Neural networks Algorithms, Applications and Programming Techniques".

EI E84 OPTIMAL CONTROL

UNIT - I

.INTRODUCTION : Statement of optimal control problem – Problem formulation and forms of optimal control – Performance measures for optimal control – Selection of performance measure – Various methods of optimization – Linear programming – Non-linear programming – Dynamic programming.

UNIT - II

DYNAMIC PROGRAMMING : Principle of optimality – Recurrent relation of dynamic programming for optimal control problem – Computational procedure for solving optimal control problems – Characteristics of dynamic programming solution – Hamilton Jacobi Bellman equation – Application to a continuous linear regulator problem.

UNIT - III

CALCULUS OF VARIATIONS : Fundamentals concepts – Functional of a single function – Functional involving several independent functions – Piecewise smooth extremals – Constrained extrema.

UNIT - IV

VARIATIONAL APPROACH TO OPTIMAL CONTROL :

Necessary conditions for optimal control – Linear regulator problems – Pontryagin's minimum principle and state inequality constraints.

UNIT - V

APPLICATIONS OF PONTRYAGIN'S MINIMUM PRINCIPLE

Minimum time problem – Minimum control effort problems: minimum fuel problem, minimum energy problem – singular intervals in optimal control problems.

TEXT BOOKS

1. B. Sarkar, 'Control System Design – The Optimal Approach', Wheeler Publishing, New Delhi, 1997.
2. M. Gopal, 'Modern Control System Theory', New Age International Ltd., 2002.

REFERENCE BOOKS

1. Donald E. Kirk, 'Optimal Control Theory – An introduction ', Pearson Education, 1970.
2. Kemin Zbou, J.C. Doyle, 'Robust & Optimal Control', Pearson Education, 1996.

EI E85 DIGITAL IMAGE PROCESSING

UNIT I

DIGITAL IMAGE FUNDAMENTALS AND TRANSFORMS

Elements of visual perception – Image sampling and quantization Basic relationship between pixels – Basic geometric transformations-Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform – FFT – Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms.

UNIT II

IMAGE ENHANCEMENT TECHNIQUES:

Spatial Domain methods: Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging –Spatial filtering: Smoothing, sharpening filters – Laplacian filters – Frequency domain filters : Smoothing – Sharpening filters – Homomorphic filtering.

UNIT III

IMAGE RESTORATION:

Model of Image Degradation/restoration process – Noise models – Inverse filtering - Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition.

UNIT IV

IMAGE COMPRESSION

Lossless compression: Variable length coding – LZW coding – Bit plane coding-predictive coding-DPCM.
Lossy Compression: Transform coding – Wavelet coding – Basics of Image compression standards: JPEG, MPEG,Basics of Vector quantization.

UNIT V IMAGE SEGMENTATION AND REPRESENTATION

Edge detection – Thresholding - Region Based segmentation – Boundary representation: chair codes- Polygonal approximation – Boundary segments – boundary descriptors: Simple descriptors-Fourier descriptors - Regional descriptors –Simple descriptors-Texture

TEXT BOOKS

1.Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education 2003.

REFERENCES

1.William K Pratt, Digital Image Processing John Willey (2001)
2.Image Processing Analysis and Machine Vision – Millman Sonka, Vaclav hlavac, Roger Boyle, Broos/colic, Thompson Learniy (1999).
3.A.K. Jain, PHI, New Delhi (1995)-Fundamentals of Digital Image Processing.
4.Chanda Dutta Magundar – Digital Image Processing and Applications, Prentice Hall of India, 2000

EI E86 COMPUTER NETWORKS

UNIT I DATA COMMUNICATIONS

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences.

UNIT II DATA LINK LAYER

Error – detection and correction – Parity – LRC – CRC – Hamming code – low Control and Error control - stop and wait – go back-N ARQ – selective repeat ARQ- sliding window – HDLC. - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11 – FDDI - SONET – Bridges.

UNIT III NETWORK LAYER

Internetworks – Packet Switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

UNIT IV TRANSPORT LAYER

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

UNIT V APPLICATION LAYER

Domain Name Space (DNS) – SMTP – FTP – HTTP - WWW – Security – Cryptography.

TEXT BOOKS

1.Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw-Hill, 2004.

REFERENCES

1.James F. Kurose and Keith W. Ross, “Computer Networking: A Top-Down Approach Featuring the Internet”, Pearson Education, 2003.
2.Larry L.Peterson and Peter S. Davie, “Computer Networks”, Harcourt Asia Pvt. Ltd., Second Edition.
3.Andrew S. Tanenbaum, “Computer Networks”, PHI, Fourth Edition, 2003.
4.William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education, 2000.

EI E87ADAPTIVE CONTROL SYSTEMS

UNIT –I

Mathematical Model: Mathematical Model for process of I order, II order – I order with pure delay & higher order system. Discretization techniques and computer solution of differential equations – simulation of process dynamics – state models.

UNIT –II

Identification of Methods: Conventional techniques of identification, Identification of systems with dead time Discrete Systems, ARMA process, discrete state model – least squares techniques – recursive least squares – generalized recursive least squares algorithms – fixed memory algorithm, Minimum variance method.

UNIT –III

Adaptive Control of Deterministic Systems: Gain scheduling, MRAC, STC, Minimum variance controller – Predictive control, Minimum prediction error adaptive controls – adaptive control algorithms for closed loop pole assignment – adaptive control of time varying systems.

UNIT –IV

Adaptive Control of Stochastic Systems: Stochastic processes, Stochastic minimum prediction error adaptive controller – adaptive pole placement – adaptive optimal controllers.

UNIT –V

State Estimation and Observers: Parameter estimation and state estimation, Luenberger, Asymptotic observers – adaptive observer – Extended Recursive least squares, FM and Kalman filter.

REFERENCES:

1. Goodwin G.C. and Sin K.S. Jersey,, “Adaptive filtering, prediction and control”, Prentice Hall, inc., 1984.
2. Mendel J.M., Marcel, Dekker, “Discrete techniques of parameter estimation”, New York, 1994.
3. Hsia T.C.H.A., “System Identification”, Lexington books, 1974.
4. Harris C.J. and Billings S.A. Peter ,“Self Tuning and Adaptive control”, Peregnius Ltd., 1984.